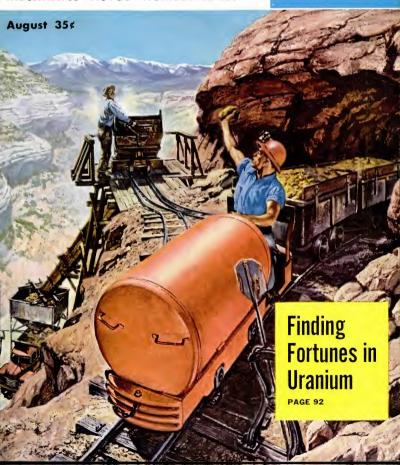
POPULAR SCIENCE

MECHANICS - AUTOS - HOMEBUILDING

America's Newest Superhighway Previewed on PAGE 65

Biggest Ship Ever Built

Exclusive Pictures on PAGE 128



BLACK FOREST KORIUM **Hunting Knife** Solingen Steel

The fomed BLACK FOREST HUNTING KNIFE mode in Solingen, West Germony of superfine Nicht Rostend Inon-rusting) steel is NOW ovoilable in this country! The rugged beauty of this superb knife has already won recognition for design in industrial circles on the Continent-ond its utility and value as an aid in hunting & fishing has made it a prime favor-ite with sportsmen all over Europe! Blade is octually sharp enough to shave with; it will stond up against the most rugged treatment; the genuine leather scabbard is metal tipped. Length, 10 inches. Tough, sturdy Solingen steel ossures you years of dependable service. The sleek, graceful lines of this new German import also provide on ideal recreation room or den decoration—a dandy gift for men—and a den decorotion—a donay girt for men—ond o hunter's delight! It's o real collector's item, too; groces ony wall or fireplace. Import sup-ply is limited and the law 3.95 price (post-poid) for 80TH knife and scabbord means you'll have to act fost! Send 3.95 for prompt delivery. CODs plus fees. Your money bock quickly if you're not delighted! Use convenient coupon below.



MAKE THIS TEST!

The Block Forest Hunting Knife is SUPER SHARP! Just try this simple test ond PROVE IT! Lother o section of your chin or cheek ond run the keen edge of the blode over it lightly. Then FEEL your skinl . . . just like shoving with your fovorite razor!

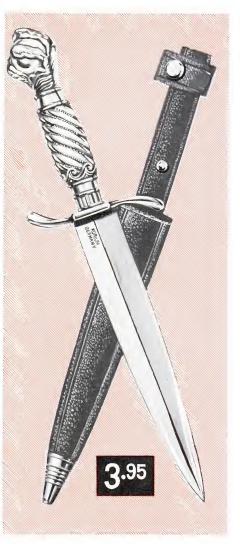
Tho	sen's Dept. 7-H-80	
352	ourth Ave., New York 10, N. Y.	

Please RUSH Block Forest Hunting Knife and genuine leather scabbord on 5 Day Triol. If I om not delighted with this re-markable hunting & fishing aid, I will return it in 5 days for FULL REFUND. 3.95 enclosed. Send prepoid. Send C.O.D. plus chorges.

NAME_

ZONE __STATE

(Canadians: Send orders direct to: THORESEN CO., Dept. 7-H-80 45 St. James St., West Montreal I, P.Q.)



No wonder it's called "!"
"Miracle Vinyl-Flooring"!

MATICO ARISTÖFLEX

RESISTS GREASE, ACID, ALKALI AND GRIME!

You'll call it "miracle flooring," too, when you see for yourself how rugged, durable MATICO Aristoflex shrugs off household acid, alkali and grease...stays new and sparkling looking with easy damp moppings. Biggest miracle of all is the price! Produced especially to meet the needs of homeowners everywhere, MATICO

Aristoflex is low in cost... gives you more for your money. And you can install economical Aristoflex in every room in your home... from basement to attic. See Aristoflex in 12 rich, clear colors at your MATICO dealer soon. You'll find him listed in your classified telephone directory.



MASTIC TILE CORPORATION OF AMERICA

Joliet, III. • Long Beach, Calif. • Newburgh, N. Y.

Aristoflex • Confetti • Parquetry • Asphalt Tile • Cork Tile • Plastic Walt Tile

INSTALL IT YOURSELF AND SAVE!



It's easy! Just mark a straight line through the center of your room in both directions, using a chalk and line. Be careful not to cover up your guide lines.



With a notched trowel, spread adhesive over onehalf of your room at a time. leave only a thin coat of adhesive on the floor.



After adhesive becomes tacky, snap the tiles into place. Do not slide tiles or adhesive will push up between the tiles.



Here's the best part! Show your wife your handiwork. (Don't tell her what a cinch it is with MATICO's easy-to-follow instructions).

Founded 1872 Vol. 165: No. 2

August, 1954



Mechanics and Handieraft REG. U.S. PAT. OFF.

Page

New Road Hops Daniel Boone's Mountains 05
Poor Man's Space Station 72
America's Best Young Driver 80
How to Shoot 158 Miles Straight Up 88
Finding Fortunes in Uranium 92
How Man Put Light to Work 98
The Truth About Your Brakes100
Big-Time Telescope Built in Basement105
Wilbur Shaw Drives the Plastic Kaiser112
Science Licks the Grasshoppers116
Two Pistons in One Cylinder Power Cycle122
Biggest Ship Ever Built128
Let's Put Some Science in Science-Fiction135
How Sailors Learn to Save a Ship141
Gus Rides Out a Storm141
How to Hitch an Engine to Your Bike147
,
Your Shop Can Save You Money
Put a Radiator Under Cover for \$3154
Make a Hood for Your Fireplace156
Put Your Picture Frames to Work157
Frame Your Pictures with Siding 158

I Built a Carport in 12 Hours	160
Husky Drill Drives Quick-Change Tools	
Kit Makes It Easy to Build a Chimney	164
He Shoots Pin-Ups at Sea	166
Hydrojet Powers Little Speedster	
10 Uses for Pipe Scraps	
Guess How These Turnings Were Made	
The Other Fellow's Shop	
TV Picture Tubes' 5 Common Troubles	
How to Build a Tesla Coil	
Whirling Rotors Lift This Gyro-Kite	
This Car Flashlight Is Always Bright	

(More features and departments are listed on page 4)

VOLTA TORREY

Managing Editor

HOWARD ALLAWAY

Art Editor

HOWARD C. JENSEN

Associate Editors

Alden P. Armagnac, Devon Fráncis. Sheldon M. Gallager, Wesley S. Griswold, Herbert O. Johansen, Martin Mann, Herbert R. Pfister, Ruth Westphal.

Harry Samuels (Director), Herbert Authory, Gene Butera, Henry B. Comstock, Mary E. Dee, Eric A. Karminski Jr., Laylen H. Sweet.

. Kendall W. Goodwyn (Director). Carol Ennis, Everett H. Ortner, Trudie Ray, Georgette Sparks.

Photography W. W. Morris (Director), Hubert Luckett, Orlando Guerra,

Assistant Managing Editors Frank Rowsome Ir.

Robert P. Stevenson Mechanics and Handicraft

Harry Walton

Midwestern Editor Kenneth Wylie (Chicago)

Western Editor Andrew R. Boone (Los Angeles)

Editorial Assistants Harriet Trowbridge, Stauley Beitler, Judith Ellis, Louise Levis,

Teresa Robbins, Rose Weil. Publisher

GODFREY HAMMOND

Advertising Director

STEPHEN P. GLENNON

Circulation Director EUGENE WATSON

ADVERTISING OFFICES: NEW YORK-353 FOURTH Ave.; CHICAGO-360 North Michigan Ave.; Detroit-820 Book Bidg.; San Francisco-114 Sausome St.; CLEVELAND-328 Citizens Bldg.; Los ANGELES-1127 Wilshire Blvd.

EDITORIAL OFFICES: 353 Fourth Avenue, New York 10, N. Y.

Avenue, New York 10, N. Y.

Published monthly at 335, Fourth Avenue, New York 10, N. Y., by Popular Science Publishing Co., Inc., Godfrey, Company of the Publishing Co., Inc., Company of the Publishing Co., Luder the act of March 3, July 26, 1946, at the Post Office in New York, N. Y., under the act of March 3, July 26, 1946, at the Post Office in New York, N. Y., under the act of March 3, July 26, 1946, at the Post Office in New York, N. Y., under the act of March 3, July 26, 1946, at the Post Office in New York, N. Y., under the act of March 3, July 26, 1946, at the Post Office of March 3, July 26, 1946, at the Post Office of March 3, July 26, 1946, at the Post Office Copyright, 1934, by Fopular Science Publishing Co., Inc., All rights reserved in all the countries participating in the Literatational Copyright Convention and Learn and and

CAN'T CHAMPIONS...





CHAMPION SPARK PLUG COMPANY

MAY 31, 1954

TOLEDO. OHIO

FOR THE SECOND STRAIGHT YEAR I HAVE DRIVEN CHAMPION SPARK PLUGS TO VICTORY IN THE INDIANAPOLIS 500 MILE RACE. AVERAGE SPEED OF 130.840 MILES PER HOUR SETS NEW RACE RECORD. THANKS FOR A GREAT PRODUCT.

BILL VUKOVICH



WITH THE EXCLUSIVE 5-RIB INSULATOR

Here's a real performance record! In their 24th Indianapolis victory Champions were the choice for every one of the 33 starting cars. And here's how they came through—

NOT ONE CHAMPION SPARK PLUG WAS REPLACED DURING THE ENTIRE RACE!

Whatever the year or model of your car, better install Champions for better performance and longer engine life.

CHAMPION SPARK PLUG COMPANY, TOLEDO 1, OHIO

AUGUST 1954 3



lead of several car manufacturers who made comparative tests and found that the sensational PROTO Torquer is faster, sturdier, and more accurate than indicating types. You'll like its automatic torque-limiting release, troublefree construction, micrometer-type adjustment, and lack of pointers and dials. Various sizes are available in foot-pound or inch-pound models, with plain or reversible ratchet head. Start saving precious time now by buying the models you nced from your PROTO dealer. Send 10¢ for 68-page catalog to PLOMB TOOL TOMPANY

In your service work, follow the

2257K Santa Fe Ave., Los Angeles 54, Calif.

NEW! Torquer Adapters

These four new torque wrench adapters simplify torquing on overhead valve engines. Their unique

shapes clear obstructions, but do not affect the Torquer's accuracy.

6420

6430



Eastern Factory_Jamestown, N.Y. Canadian Factory_London, Ont.

News and Pictures

Giant Gyroscope Tests Turboprops	77
Bantam Jet Can Tote A-Bomb	78
Britain Leads Us in Atomic-Power Race	85
3-D Photos Fix Accident Blame1	08
No Depositor Too Small for This Bank1	20
Model Racing Car Has Clutch and Fan 2	206

Mechanics and Homebuilding

New for Your Car	152
Calk Compound Cleans Clocks	
Mirror Helps Mother Watch Baby	185
Jeep-Mounted Ladder Gets the Apples	
Trash-Can Stand Keeps Yard Neat	$\overline{211}$

Departments

Letters	14
Last-Minute News and Notes	62
New Ideas from the Inventors	109
I'd Like to See Them Make	126
New for the Handy Man	159
Wordless Workshop	178
New Tools	180
Keeping the Home Shipshape	201
New Shop Ideas	207
Craftsmen at Work	212
Hints from the Model Garage	216
How Much Did You Learn?	250

His Pictures Almost Talk



IF ANYONE could make the Einstein Theory understandable in drawings it is Ray Pioch; we just haven't asked him to tackle that job yet. Pioch is a free-lance artist whose knack for making popular presentations of technical subjects has kept him busy turning out work for POPULAR SCI-

ENCE MONTHLY for more than eight years. Every mouth you can see examples of his skill in the "New Ideas from the Inventors" feature, where he translates complicated patent drawings into simple, understandable line sketches. To illustrate "Poor Man's Space Station," on page 72 of this issue, Pioch picked the brains of a physicist to show you what the MOUSE artificial moon would look like.

For relaxation, illustrator Pioch gets far away from his drawing board in his bright red, 235-horsepower convertible.

Head Only

of Plain

Head

For real job security...

FILL THE GAPS IN YOUR

THE pressure is mounting. Competition for jobs is growing fast. Business and industry are tightening up. Every man or woman holding a good job is now, in effect, "on probation."

Are there "weak spots" in your training? Now's the time to get after them! Six months from now may be too late.

How can you fill the gaps - quickly? International Correspondence Schools can help you! There's no faster, surer way to get exactly the training you need!

You have 277 famous, spare-time I. C. S. Courses to choose from: trade, industrial engineering, office, executive, high school. Or you can arrange for "refresher" courses, advanced training or special instruction combining two or more specific business or technical subjects.

I. C. S. has the most complete line-up of jobrelated instruction you can find anywhere. Courses are tailored to fit your needs. This means you waste no time on subjects you can't use. You lose no time traveling back and forth to classes. You set your own schedule-no interference with business or social activities.

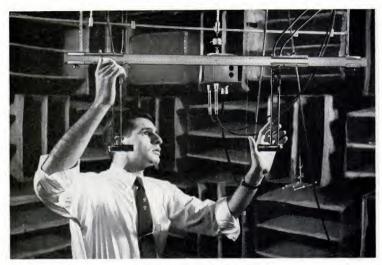


Find out for yourself how quickly, how thoroughly I. C. S. can fill the gaps in your training! No obligation. Just mark and mail the coupon!

FREE BOOKS

32-page, pocket-size gold mine of facts, "How to Succeed," plus catalog outlining opportunities in field that interests you!





In a quiet room at Bell Laborataries an engineer scales aff the distance between twa candenser micraphanes during a calibrating test. Able to measure air pressure variations of a few billianths of an atmasphere, such microphanes play a crucial role in the scientific study of telephane instruments.

SOUND STEPS ON THE SCALES

Those small cylinders facing each other are condenser microphones measuring tools that play a vital part in making your telephone easier to hear and talk through.

They are being calibrated by an engineer at Bell Telephone Laboratories to give extremely accurate information on the kind of sound your telephone company handles. Armed with these vital fundamental data on what sound is, Bell Laboratories

scientists devise the instruments and equipment that transmit it best.

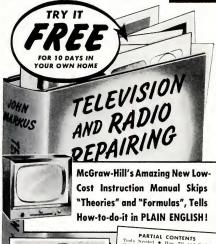
At Western Electric Company, the manufacturing unit of the Bell System, a condenser microphone "listens" as your ear would listen to every telephone before it goes into service. The condenser microphone is but one of many precise tools that Laboratories scientists have developed to make telephone service better and more economical.

BELL TELEPHONE LABORATORIES



Improving America's telephane service offers careers far creative men in scientific and technical fields.

NOW...Start Fixing TV and Radio Sets RIGHT AWAY



PARTIAL CONTENTS
Toda Necetie 4 flow Tv and Italia
with 4 flow to Remove and Retplace Transport of the Transport of the Remove and Retplace Transport of the Transport of the Red Transport of the

TELLS HOW TO "Cosh In" ON THE BIG DEMAND FOR RADIO-TV REPAIRMEN

Over 25 million TV sets over 100 million radius n this country! Shortage of killed renafraen! You ran Prove It on Your Own Set Save up to \$50 a year just by justallaing, repairing, and servicing your own TV set. Book lells which controls to adjust or tubes to replace if picture is adjust or tubes to replace II pleture is entirely dark - blurred - split - distorted - off center - tilted - wiggles and weaves - too pale - too black - jitters - snows - drifts - etc., etc.

... even if you have never fixed a LAMP or DOOR BELL before!

"W hy hasn't somebody done this BEFORE?" That's what you'll say the minute you start browsing through this amazing new and complete one-yolume instruction-manual in radio and TV repairs.

For here at last a well-known EXPERT has found a way to tell you in PLAIN ENGLISH how to fix almost ANY radio or television set. (And to hx almost ANY radio or television set. (And he even tells you where you can go to have the extra-tough jobs done FOR you at professional rates.) Right from the very first chapters you can start doing simple repairs and before you're HALF way through the book, you can ix HALF the television and radio sets that you encounter. Surprisingly quickly you can fix your own and friends sets... get a service shop job ... even start your own money-making business right in your own home.

Why It's So EASY to Understand

No electronic formulas . . . no algebra . . no laboratory experiments. Instead you deal only with the things that go wrong in sets—how to recognize and spot the trouble—and what to do about it. Easy as A.B.C. directions and 700 clear photos, diagrams, and draw and an exactly WHAT and HOW to disk, step-by-step.

The author is Associate Editor of Electronics Magazine. He's a long-recognized expert—not only on radio and TV—but also on making techonly on radio and IV—but also on making econ-nical subjects easily understood by the average reader. He has spent FOUR years making this one-volume instruction manual so practical and reader easy-to-understand that even a man who never fixed a door bell before will have no trouble.

Here's everything you need to know about where and how to buy tubes and parts, where and how to get a circuit diagram for any receiver; how how to get a circuit diagram for any receiver, into choose and use basic tools; how to test tubes WITHOUT a tube tester; how to adjust 58 common TV controls; how to "diagnose" and "cure" common radio and TV troubles; how to fix or replace loudspeakers, phono pickups; how to in-stall and check antennas; and much, much more.

SEND NO MONEY

Examine this big 536-page book for 10 days BEFORE you decide if you wish to own it. Try to ut FREE on your own set. See how easy it makes your handling of repairs. Take 10 days to prove it PAN'S FOR ITSELF, or don't keep it. Just mail coupon to: McGraw-Hill Book Ge, Just, Dept. PS-4, 327 West 14th 37, New York 28, N. Y.

Trouble-Shooting Chart Tells Where to Look for Bad Tube IF:

No picture; no raster; no sound.
No picture; raster OK; no sound.
No picture; no raster: sound OK.
No picture; no raster: sound OK.
Picture wiggies and weaves, lacks
lilacks, or ls very black; raster OK;
wound OK.

Picture littery, double image; raster OK; sound OK,

Snow on all channels; raster OK;

Snow on all channels, raster OK; sound OK. Picture and raster do not fill screen;

sound OK.

Pleture drifts up and down but not sideways; raster OK; sound OK.

Pleture muddy and gray; raster OK; sound OK.

. . . PLUS 29 OTHER COPMON TO

FREE	10-DA	Y TRIAL	COUPON
41 C H	III Book Co.	Inc. Dept. F	5-8

McGraw-Hill Book	Co., Inc., Dept. PS-8
327 West 41st St.,	New York 36, N. Y.
	for 10 days' FREE EXAMINATION Television and Radio Repairing," by
	not delighted with it. I may return Otherwise, I will keep book and

book, nav nothing. Otherwise, I will keep book an send only \$1.95 plus postage; followed by 3 monthly in stallments of \$2.00 each.

SAVE MONEY. Cheek here if enclosing full price of 7.9.9 Writ His counton, Thom Wri. will pay delivery. Same 10-day return privilege-full return guaranteed.

ENJOY ALL SPORTS THIS NEW WAY!



NOW Get Close-ups ALL DAY Without Fatigue!

At this SLASHED PRICE, Western Germany's famed bluocular-speciacles are the optical BARGAIN OF THE glasses—hour after hour—without faligue! Use them to watch BASEBALL, 1000 CCC, 1000 CCC

See Better . . . Get Extra Thrilisi Telekular-Spectoscopes are a new, truly powerful optical design that gives you greater range than many expensive greater range than many expensive opera or field glasses and a far greater field of view than some selling for many times more, INDIVIDUAL fo-cusing for each eye—for close-up OR distant viewing!

Try of Our Risk! Enjoy at our risk for 5 days. You

BIG

MUST be delighted! Otherwise your money will be refunded with no ques-tions asked! Send check, cash or m.o. for 88c plus 12c for tax & delivery (Total 1.00). Use the handy coupon be-low—PROMPT DELIVERY, Send TO-DAY to:

DAY to: THORESEN'S, Dept. 7-G-90 352 Fourth Ave., New York 10, N. Y. (Canadians: Send orders direct to: Thoresen Co., Dept. 7-G-90, 45 St. James St., West, Montreal J. P.Q.)

'NOW I'M MY OWN BOSS at Double My Former Salary"

Steps Up Earnings to Over \$100 a Week

As A CUSTOM

"I can hardly believe how quickly I've gotten aher ing and profitable trade. I was a mechanic making I operate my own shop and make over \$100 a week

WHAT DO YOU WANT? Your Own Profitable Business—A Steady Job—Substantial Sparetime Earnings—A More Secure Future?—They're all waiting for YOU in the Big-Opportunity Fleld of Custom Furniture Upholstery.

The big nationwise home and institutional building boom has created a great demand for trained upholsterers. Prepare for this big-money to the property of the

OUT TREE book. "YOUR NEW WAY TO A SUCCESSFUL OF A SUCCESSFUL O

Court toop	
YOU MAKE SLIPPER CHAIR	
CLUB CHAIR	S
OTTOMAN	
SLIP COVERS	

END FOR BIG FREE BOOK

UPHOLSTERY	TRADES	SCHOOL,	Dept.	CM-1605

/21 Broad	lway, N	ew York 3, N.	Υ.	
Send me		book on: In N.Y.	School	Training

Zone_ State Check if Korean Veteran

8463 S. Van Ness, inglewood 4, Calif.

Prints Postal Cards! 4

Use on 30 Day Trial! Send name today for facts and FREE Illustrated Book of unique advertising plans and money-making ideas for your business. Learn how others are boosting sales with post card ads . . . easy with Cardmaster.



It's Quick, Easy, Fun To Learn A LANGUAGE by LINGUAPHONE

AT He9E, in 20 minutes a day you can quickly, easily, LHSTN, and learn Freich, Spaints, German, Italian, Russian, Japanese, Modern Greek any of 29 languages by LINGUAPHONE World's Standard Conversational Method, Opens door to new business, professional, cultural and travel opportunities. Send for fascinating FREE book, "Passport to A New World of Opportunity."

LINGUAPHONE INSTITUTE 147-08 RCA BUILDING

NEW YORK 20, N. Y.



So that you may hear the true miracle of these low-cost high-fidelity recordings we offer

of these Musical Treasures Yours for only

on this 12-inch long-playing (331/3 rpm) Pure Vinyl, custom pressed guaranteed HIGH FIDELITY recording

BEETHOVEN'S

5th SYMPHONY

and on the other side

SCHUBERT'S

"UNFINISHED" SYMPHONY No. 8

NOW You Can Own And Enjoy The Best-Loved Symphonies, Concertos, Operas, Musical Comedies —ALL AT LESS THAN HALF THE USUAL COST!

HERE IS ALL YOU HAVE TO DO ... mail the coupon below and we will send you — for only 10¢—BOTH Beethoven's 5th Symphony AND Schubert's 8th Symphony—both COMPLETE on one 12" long-playing high-fidelity record! We make this sensational offer to acquaint you with the remarkable new program called MUSIC TREASURES OF THE WORLD!

Under this program, you can now own a complete library of high-fidelity recordings of the world's greatest music . . . Beethoven, Bach, Brahms, Mozart, Tchaikovsky, Gersh, Bach, Brahms, Hozart, Tchaikovsky, Gersh, all the great composers, both serious and light! Brand-new performances by world-famous orchestras under eminent conductors like Graunke, Dixon, Hendl, etc.—recorded especially for this brand-new series.

High fidelity recordings like these usually sell for \$5.95 each—but assured distribution to members and mass production high fidelity



pressing equipment enable us to offer these 12" long play records to our members for only \$2.98 each!

HOW THIS MUSIC PLAN OPERATES

Just mail the coupon, together with 10¢. You will also receive, free, the first treatise of our Music Appreciation Course. In addition, you receive an Associate Membership. This does not obligate you to purchase any additional recordings ever! Each month you will be offered a new 12" long-playing record at the special member's price of only \$2.98 each (plus a few cents for U. S. tax and shipping). If you do not wish to purchase any particular record, you need merely return the form provided. And whether or not you purchase any additional records, you still receive, each month, a new issue of our Music Appreciation Course — free! So mail coupon NOW!

MUSIC TREASURES OF THE WORLD, 100	SIXTH AVE., NEW YORK 13, N. Y.
MUSIC TREASURES OF THE WORLD, Dept. 123,100 SIX	TH AVE NEW YORK 13, N. Y. PS-8:
Here is my 10¢ as payment in full for the 12" long-playing record described above — plus the first treatise of your Music Appreciation Course — which I may keep whether or not I purchase any additional records. Each month, as an Associate Member I will receive advance notice of the new record release, which I may purchase at the special member's price of only \$2.93 per record, plus a few cents for U. S. tax and shipping. If the control of the property of the	BOTH—Complete—for only 10¢ BEETHOVEN'S 5th Symphony SCHUBERT'S 8th Symphony Membership Limited to One Subscription Per Family Name
CANADIAN ADDRESS, 1104 Cart	efield Ave. Terente IO Ont

NEW RODIES



"Here's what I did for THOMAS MANFRE ... and what I can do for you!" -Charles Cittas

G IVE me a skinny, sec-ond-rate body — and I'll cram it so full of hand-I'll cram it so full of hand-some, bulging new muscle that your friends will grow bug-eyed! . I'll wake up that sleeping energy of yours and make it hum like a high-powered motor! Man, you'll feel and look different! You'll begin to LIVE!

Let Me Make YOU a NEW MAN IN JUST 15 MINUTES A DAY IN JUST 15 MINUTES A DAY
YOU WOULD'T believe it, but I myself used to be a 97-ib. Weakling.
Fellows called me "Skinny." Girls
Fellows called me "Skinny." Girls
THEM I discovered "Dynamic Tension." And it turned me into such a
complete specimen of MANHOOD
that today I hold the title "THE
WORLD'S MOST PERFECTLY DEVELOYED MAN."

My Secret — "Dynamic Tension"

My Secret — "Dynamic Tension" When you look in the mirror and see a healthy, strapping fellow smilling for the strapping fellow fel

FREE My 32-page Book - Not \$1. or 10c - But FREE

Send NOW for my famous book, "Everlasting Health and Strength." 32 pages, erammed y honographs, valuable advice, answers to many vital

valitable advice, answers to many vital questions. Questions of the property o



CHARLES ATLAS, Dept. 1-H, 115 East 23rd St., New York 10, N. Y.

Send me-absolutely FREE-a copy of your famous book, "Everlasting Health and Strength" 32 pages, crammed with actual pho'os, advice, I understand this book is mine to keep, and sending for it does not obligate me in any way.

(Please print or write plainty)

7 FOREIGN STAMPS

only 25¢

\$9.50 value includes:

STALIN DEATH
 STAMP — special

black-bordered issue! NEW ZEALAND -98-year-old proof of Queen Victoria, Sold for \$5 at auction.

ISRAEL — complete sheet of first issues.

You get all 3 scarce items shown (alone

You get all 3 scarce items shown (alone Druffn issue from worth \$7.00)—plus LUNDY, fantastic BERLIN BEARS, cpl. set for Russian Zone; \$FAIN. 3 Iberia Airmalis; FRANCE, 3 re-issues of 104-year-old artitles—plus hundreds more! Grand total of 317 different stamps—reg. \$9.50 value—for just 25¢ to introduce our Bargain Approvals. Included FREE, "Midget Encyclopedia -plus Stamp Dictionary and Identifier. Send of Stamps"-plus Stamp Dictions 25¢ today. Money back guarantee.

ZENITH CO., 81 Willoughby St., Brooklyn 1, N. Y.

THE PLASTEA Industry needs manufacturers on small scale and for big production of Linps and Clock Marble initiation. Experience unnecessary. Jee meterial makes regular fits some sellers, flusher mould religiously the sellers and the sellers with the mould religiously the sellers and the sellers with the sellers and the sellers with the sellers

A "GOOD HAND" HELPS YOU SUCCEED! ille LEARN TO WRITE WELL lour Handwriting quickly improves with our easy-tounderstand picture tessons; but your bore time
"How to Become a Good Penman," or check
volumes wanted below at \$1 each." Business

| Bird A Design Flourishing | Carpossing
Aphabets, COMPLETE SET \$4.50. Ask for
price 181 of perman's supplies.

TAMBLYN SCHOOL of PERMANSHIP

| A Jille, Pra. 435 Bidgs Bidg, Kenses Cly, Ro., 918 Name beautifully



Only 100

INVESTIGATOR TRAINING

Experience unnecessary. Many opportunities. Send for Free particulars. Free credentials.

EXCHANGE SECRET SERVICE SYSTEM 4360 Broadway Chicago 13, Ill.

	•		9	
MAIL	COUPON	FOR QUICK	ACTION! -	
Exchange Secret	Service	System		
4360 Broadway.	Chicago	13. 111.		

			-				
Wlthout	cost	or	obligation	please	mail	Free	particulars

Name.	٠.	٠	٠	•	٠	٠	٠	٠	٠	٠	٠	٠	٠	٠	٠	•	•	٠	•	٠	٠	•	٠	•	•	•	٠	٠	٠	•	٠	٠	٠	٠	•	٠	٠	•	٠	
Addres	s.																								R	F	D	,	0	r	2	ю	n	e						
City																									S	t	31	e												

Good Pay-Security-Promotions for You



ized, creating job demand and bright future for men who qua



RADIO-TELEVISION 115 million home and auto SERVICING vision homes (with total growing rapidly) mean increasing opportunities for qualified servicemen. Many NRI students make \$10, \$15 a week extra fixing sets in spare time while training. Many NRI graduates

Let Me Show How You Can Qualify for RADIO-TELEVISION, on in Spare Time

DONAL PARIO INSTITUTE WASHINGTON, D. C.,

trained more men for

TRAINING plus OPPORTUNITY is the PERFECT combination for ambitious

men. Let me send you a sample lesson men. Let me sen you a sample tesson from my course to prove you can keep your job while TRAINING at home in your spare time, for better pay and a brighter future. I will also send my 64-page book to show you that Radio-Television is today's field of OPPORTUNITY for prop-

Practice Broadcasting or Servicing

with Kits of Parts I Send You



Television Growth Making More Good Pay Jobs, Prosperity

Radio is bigger than ever and Television is still growing fast. Government, Aviation, Police, Ship, Micro-wave Relay, Two-way Communications Systems for buses, taxis, trucks, railroads are other growing fields providing good job oppor-tunities and bright futures for men properly

Start Soon to Make \$10, \$15 a Week Extra Fixing Sets

You can start to cash in fast. Many men I train fix neighbors' sets, make extra money, starting soon after they enroll. Multitester built with parts I send helps locate and correct set troubles. Read at left how you build actual equipment that gives you practical experience with circuits common to both Radio and Television.

Mail Coupon - Find Out About Tested Way To Better Pay

l Trained These Men





Mr. J. E. SMITH, President, Dept. 4HB

Mail me Sample Lesson and 64-page Book, FREE. (No

outcommit will conti	ricase wire planings	3
NAME	AGE	1
ADDRESS		-
CITY	ZONE STATE	
VETS WRITE IN	HARGE	1





BENJAMIN FRANKLIN (A Rosicrucian)

WHY was this man great? How does anyone -man or woman-achieve greatness? Is it not by mastery of the powers within ourselves?

Know the mysterious world within you! Attune yourself to the wisdom of the ages! Grasp the inner power of your mind! Learn the secrets of a full and peaceful life!

Benjamin Franklin-like many other learned and great men and women-was a Rosicrucian. The Rosicrucians (NOT a religious organization) first came to America in 1694.

Today, headquarters of the Rosicrucians send over seven million pieces of mail annually to all parts of the world. Write for YOUR FREE COPY of "The Mastery of Life"—TODAY. No obligation. No salesmen, A non-profit organization. Address: Scribe H.F.C.



THIS BOOK

The ROSICRUCIANS SAN JOSE • (AMORC) • CALIFORNIA

-- SEND THIS COUPON-

Scribe H.F.C. The ROSICRUCIANS (AMORC) San Jose, California	
Please send me the free book, The Mastery of Life, which explains how I may learn to use my faculties and powers of mind.	
Name	
Address	
City	

more jobs than graduates

Demand far aur engineering graduates exceeds supply. Effective place-ment! Study in this world-famed college . . . established 1884. New term starts quarterly. Appraved for Korean Vets.

Bach. Sc. degree in 27 months

Bachotor of celeure in Mesandion, Citi, Macronal Chemical Aronnology, Italia (1997), Aeronautical, Italia (Televiston), Administrative Engineering: Business Administration and Accounting, Also 3d-week certificate (Indiana and Indiana and Indiana

Reautiful campus in friendly college town, Weil-equipped, new and modernized buildings and tabs. Enter Sept., Jan., March, June. Write Jean McCarthy. Director of Admissions, for Catalog and View Book.





ARTOONISTS' EXCHANGE

Dept. 198D, Pleasant Hill, Ohia

FREE SAMPLE LESSON Cash in on growing opportunities. Study at home or in person with Chicago School of Watchmaking. Approved for veterans,

CHICAGO SCHOOL OF WATCHMAKING

2330 Milwaukee Ave., Dept. 484, Chicago 47, III.

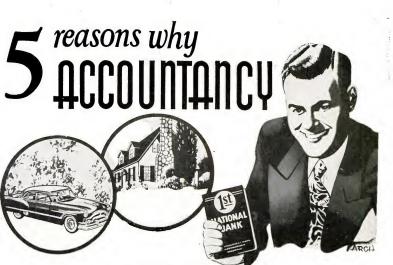
THE PARTY OF	E
Joe V	P.
N. E.	2:

BUILD 15 RADIOS AT HOME WITH THE PROGRESSIVE RADIO "EDU-KIT"

\$19⁹⁵ ONLY COMPLETE II Parts, Instructions, Soldering Iron, PROGRESSIVE "EDU-KITS" INC.

Dept. PS-820, 497 Union Ave., Brooklyn 11, N. Y.
RUMI ME THE POLLOWING:
Free Descriptive Literature—No Obligation.
Free Valuable Radio and TV Guides—No Obligation.

Name	*	• •	•	•	•	٠	•	•	٠	•	٠	٠	٠	٠	٠	٠	٠	•	٠	•	٠	٠	•	•	•	٠	٠	٠	٠	٠	•	٠	٠	•	٠	•	٠	٠	٠	•	•	٠	٠	•	٠
Addre	55																																											:	



offers you MORE MONEY... and SUCCESS!
REASON #1. If you were an expert accountant right REASON #5. Without losing a day from your present

REASON #1. If you were an expert accountant right now, chances are you would find yourself among the highest-paid of all professional men and women. Even back in "depression years," surveys showed that accountants earned more on the average than men in other major professions.

REASON #2. The demand for accountants is great everywhere. All businesses must have trained accountants to cope with ever-growing requirements. It's a profession offering wide opportunity—always—to the man who knows.

REASON #3. You can fit into any business, anywhere in the country—because accounting principles are universal. Think what this means in terms of security and independence!

REASON #4. Accountancy is open to all. Any man or

woman of good intelligence, who enjoys figure work and is willing to follow LaSalle's systematic 'problem method' plan, can rapidly qualify for a highly profirable, enjoyable lifetime career... and he doesn't have to finish his training before beginning to 'cash in."

LASALLE 417 S. Dearborn St., CHICAGO 5, ILL. CET EDEE SAMPLE LESSON

into high-paying careers.

GET FREE SAMPLE LESSON



L	a	S	a	H	e	E	x	t	e	n	s	i	0	n		U	n	i	v	e	r	S	i	t	y
	_	_	_	Δ	C	ori			0	n	l a				l n	e f	it.	. 1	in	-	_	_	_	_	

work, you can prepare in spare hours at home, at low cost, under LaSalle's step-by-step "Problem Method" of "learning by doing." This famous plan accounts for LaSalle's remarkable record of having trained nearly

10 per cent of all Certified Public Accountants in the

U. S. . . . and of having put many thousands of others

Send today for Free Sample Lesson and "Accountancy, the Profession That Pays." Learn about the five great

fields of opportunity ... and LaSalle's time-tested plan for helping men and women to rapid advancement,

higher income, greater prestige and professional stand-

ing. The coupon below will bring this information to you—without cost or obligation.

MAIL THE COUPON-NOW

Dept. 883H 417 S. Dearborn St., Chicago 5, III.

Please send me, free of all cost or obligation, a sample lesson in Accounting . . . also, your 48-page illustrated book, "Accountancy, the Profession That Pays."

Name. Age.

Address.

City, Zone, State.

Your engine's life depends on a film of oil 4 times thinner than a razor blade!



A razor blade may be only 4/1000ths of an inch thick, but that's 4 times as thick as some engine clearances!

Use high-quality Quaker State for the <u>super film</u> that assures less wear, greater economy

IT'S A SUPER FILM! The wonderful protective film your engine gets with Quaker State Motor Oil! Rich, enduring, highest quality, it keeps your engine cool and clean, guards against wear, rust, and acids. Refined from 100% Pure Pennsylvania Grade Crude Oil, nature's best. The product of a half century of specialization in automobile lubrication—it is designed for today's demanding engines. Economical, too—because it lasts longer!

Quaker State Motor Oil is made to suit the requirements of all makes of cars and for every type of service. Ask your dealer.



QUAKER STATE OIL REFINING CORPORATION, OIL CITY, PA. Member Pennsylvania Grade Crude Oil Association Letters____

Apologies to St. Paul

Your June issue [p. 76] stated that Minneapolis would be the only American city to see the sun totally blacked out in the eclipse of June 30.

I live within 10 miles of Minneapolis, in another American city, and—as I write this—hope to see the eclipse fine from my own back step.

W. R. Greer, St. Paul, Minn.

To Reader Greer, and the 311,348 other residents of St. Paul, our sincerest apologies for an unintended slight to one of America's great Twin Cities.

Boys Take to the Trees

This is to express our appreciation for the true-life story, "Our Boy Lives in a Tree," that you published in May [p. 93]. I have heard many compliments about it and it has inspired many younger boys in my neighbor-



hood to build a tree house. When they are in their tree house, they are out of trouble. ROBERT L. HARRIS, sec., junior class,

· Wilmore High School, Wilmore, Ky.

Tribute from a Skin Diver

I am a very ardent skin diver—a wonderful sport which I took up after reading your article on how to build a diving lung last year. This year I decided to buy a commercial outfit and found it wonderful.

Now, after reading the special section in your June issue [p. 163], I am building

INVENTORS

Learn how to protect your invention. The U. S. Patent Laws provide that any new and useful art, machine, article of manufacture, or composition of matter, or any new and useful improvement thereof, may be patented if the act of invention is involved. Therefore, every inventor with a valuable invention should take advantage of the Patent Laws and proceed for patent protection in order to safeguard his rights.

A patent gives the inventor the exclusive right to prevent others from making, using, or selling the invention claimed in the patent for a period of seventeen years.

The Patent Laws were enacted for the benefit of the inventor to give him protection for the features of his invention which are patentable. These features must be properly and concisely set forth and claimed in a formal application for patent, in order to comply with the requirements of the Patent Laws. For that reason, unless the inventor is familiar with patent matters, he should engage a competent registered patent attorney or agent to represent him. We are registered to practice before the U. S. Patent Office and are prepared to serve you in the handling of your patent matters.

A specially prepared booklet entitled "Patent Guide for the Inventor", containing detailed information with respect to patent protection and procedure, together with a "Record of Invention" form will be promptly forwarded to you without obligation upon request.

CLARENCE A. O'BRIEN & HARVEY JACOBSON

Registered Patent Attorneys

42-H DISTRICT NATIONAL BUILDING
WASHINGTON 5. D. C.



ALSO GET READY for a Big Pay Job or a Business of YOUR OWN

Get the Best in TV Training

GOT THE BOST IN V ITAINING
NOW you can BUILD YOUR OWN IY SET and at the same time
train at home for a BUILD FOUR OWN IY SET and at the same time
train at home for a BUILD FOUR PLANT IN THE PROPERTY OF THE ACT OF THE PROPERTY OF THE PROPER

WE SEND YOU VALUABLE KITS

Hundreds of Parts, Tools, Equipment come

SHOWS BOOK YOU TELEVISION Gives you HOW! nd figures. Also shows twenty
make varise includes inch sere MAIL COUPON

EXTRA CASH Make Money In Spare Time. We show you

COMMERCIAL TRADES INSTITUTE Dept. T1-8, 1400 Greenleaf Ave., Chicago 26, III.

YOU

Send big FREE Book telling how I can Train at Home and Make Big Money in Television.

an outfit with hose. I think that it will be more practical than my self-contained outfit for long, shallow dives.

PIERRE BOUCHER, Montreal

How to Quiet a Workbench

That guy who wrote you about putting rubber half soles on his platform rocker to keep it from "walking" [July, p. 8] had a good idea, but I think I've got an even better one. I put rubber heels on my work-



bench. They compensate for slight unevenness in the floor, protect the linoleum on it, absorb hammer-blow shocks, prevent wobble, keep the bench from skidding and -best of all-dampen out vibrations, so the floor doesn't behave like a sounding board. Andrew Vena, Philadelphia

We Get Around

It might interest you to know that nearly 800 students and the staff of our Institute read POPULAR SCIENCE every month. It is read over and over again until the pages fall apart!

R. A. CAPTAIN, Librarian, S. J. Occupational Institute, Bangalore, India

How to Rein a Rearing Tractor

After reading your article on "How Not to Drive a Tractor" [June, p. 133], I have a suggestion to make in the interest of saving lives. Why not insert a mercury contact switch, on or near the distributor, that would cut out the ignition when the front end rises to an angle of 45 degrees?

G. L. CHAMPAGNE, Convent. La.

We understand that this has been tried but isn't a dependable safeguard: a tractor that gets that far off balance is likely to turn on over.

A Buick's Life on the Range

About four years ago, I believe, you published a long article with pictures of a specially built Buick destined for the King

INVENTORS

If you believe that you have an invention, you should find out how to protect it. The first step is to have a search made of the prior pertinent U. S. patents. If a report on this search indicates that the invention appears patentable you can apply for a patent, and the specifications and claims should be prepared.

The firm of McMorrow, Berman & Davidson, with offices in Washington, D. C., is qualified to take the necessary steps for you. We can make a preliminary search on your invention, advise you whether we think it can be patented, and prepare your application for patent.

Unless you are fully familiar with the U. S. Patent Laws, we recommend that you engage the services of a Registered Patent Attorney to protect your interests. The patent laws are your laws. A patent gives you the right to prevent others from making, using or selling the invention claimed in your patent for a period of 17 years.

Use these patent laws for your protection. Investigate whether your invention can be patented. If you have what you believe to be an invention, we suggest that you have this firm make a search for you.

Send for a copy of our Patent Booklet entitled "How To Protect Your Invention," containing information about patent protection and patent procedure. Along with this we will also send you an "Invention Record" form, for your use in writing down and sketching details of your invention. We will mail them promptly. No obligation. They are yours for the asking.

McMORROW, BERMAN & DAVIDSON

Registered Patent Attorneys

PATENTS • COPYRIGHTS • PATENTS
1424 VICTOR BUILDING, WASHINGTON 1, D. C

Ranch in Texas [Jan. '50, p. 98]. That article has been a memorable one to me. I was very interested in the special features that were supposed to keep the car in its rugged condition. If it is possible, I would now like to see a picture of this vehicle after it has had four years of service.

Donald V. Doyle, Sioux City, Iowa

Here is a picture of El Kineno, as the specially built Buick was named, after four



years and 25,000 rugged miles on the range. Gillespie Bnick in Corpus Christi, which services the car, reports that while the mileage hasn't been great, the car has had hard workouts in heavy sands, and scatting across open plains, chasing coyotes.

Engine, transmission, cooling system and special equipment, even including the air cushions, have been standing up very well.

Handy Lady

In spite of being a woman, I followed your April-issue directions [p. 241] and converted my lawn mower to power. No male help, but it works fine.

Now, something for you: To quiet a noisy, "dancing" electric fan, I put a lot of lead fishing sinkers in the hollow pedestal base and poured in melted paraffin. Then I jigsawed out a hardboard base with three rubber bumpers on it. The fan is quiet now.

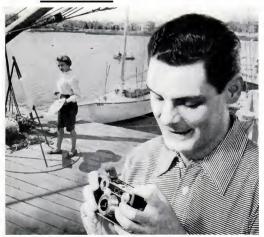
Grace Hartt Rose, Tampa, Fla.

Nice going, Ma'am'. A tip, though: It is technically "cleaner" to balance out vibration than to damy it out.

Monster vs. Brute

I have a few comments to make about Eddie Yung Jr.'s letter in your May issue (p. 16) concerning, Bob Schmitt's twinengine motorcycle. The Monster, as it is called, clocked 129.87 m.p.h. at the end of a quarter-mile, from a standing start. Mare-

NEW GREASELESS WAY TO KEEP YOUR HAIR NEAT ALL DAY



Outdoors a lot in summer? Use Vitalis... and stay as unruffled as this!

New Vitalis with V-7 makes even dry, unruly hair easy to manage

V-7, the greaseless grooming discovery now in Vitalis, outdates messy oils. Keeps your hair neat, yet you never have an over-slick, plastered-down look.

Vitalis gives extraordinary protection against "summer dryness"—dull, brittle hair, parched scalp. Also, it maintains hair's natural moisture balance better than any other leading tonic.

VITALIS® HAIR TONIC WITH V-7



THESE MEN ARE GETTING PRACTICAL TRAINING

ELECTRONICS - m

On Real:

A.C. and D.C. MOTORS GENERATORS **SWITCHBOARDS** CONTROLLERS WIRING JOBS APPLIANCES **ELECTRONIC UNITS**

(Shown at left - Instructor explaining operation and testing of a large Motor Generator in our A.C. Department.)

)N-PA

On Real:

TELEVISION SETS RADIO RECEIVERS F.M.

(Frequency Modulation) **ELECTRONICS** RECORD CHANGERS AUTO RADIOS

PUBLIC ADDRESS Systems

(Right—Instructor helping students check the wiring and trace circuits of television receivers.)



Train in the great SHOPS of COYNE

Largest, Oldest, Best Equipped School Of Its Kind In The U.S. Mail Coupon for

Whether 17 or up to 45 years of age, prepare for your future now. Don't be satisfied with a "No Future" job. Train the Coyne way for a better job in a field that offers a world of opportunities in the years ahead.

FINANCE PLAN Enroll now, pay most of tuition later. Part-time employment service while

training, if needed. WE TRAIN YOU IN CHICAGO, At Coyne you learn on real, full-size equipment. Trained instructors show you how, then you do practical jobs yourself. No previous experience or advanced education needed.

CLIP COUPON NOW for big new illustrated Coyne book "Guide to Careers in ELECTRIC-ITY and TELEVISION-RADIO". No obligation; no salesman will call. Get vital facts now!



APPROVED FOR VETERANS

B. W. COOKE, President COYNE ELECTRICAL SCHOOL 500 S. Paulina St., Chicago 12, Ill. Dept. C4-73H

Send BIG FREE book and details of your training offer. This does not obligate me and no salesman will call. I am interested in:

Big Free Book

□ ELECTRICITY TELEVISION-RADIO

NAME
ADDRESS

CITY.....STATE.....

B. W. COOKE, Pres. FOUNDED 1899

A TECHNICAL TRADE INSTITUTE CHARTERED NOT FOR PROFIT 500 S. PAULINA St., CHICAGO, Dept. C4-73H
ELECTRICITY & RADIO & TELEVISION & REFRIGERATION & ELECTRONICS

AUGUST 1954 19

1664

This Big Practical Book gives full information with working diagrams covering the principles, construction, ignition, service and repair of modern AUDELS cars, trucks and buses.

Diesel Engines, Hydramatic & Fluid Drives Fully Explained.
A complete Guide of 1604 pages, with over 1500 illustrations showing inside views of working parts, with instructions for service jobs.

IT PAYS TO KNOW

How to fit pistons—How to locate engine knocks. How to fit connect-ing rod bearings—How to service main locat-ings—How to recondition valves—How to

ings—How to recondition varies—How to the time valves—How to adjust fan belts—to rebuild a clutch—How to service automatic transmissions—How to styrice brakes—How to adjust steering gear—How to cope with ignition troubles—How to serve ice distributors-How to time igni-tion-How to "tune up" an engine.

PAGES

PACTICAL

SERVICE

IN A

HANDY

COMPLETE • PAY \$1 A MO. TO GET THIS ASSISTANCE FOR YOURSELF SIMPLY FILL IN AND MAIL COUPON TODAY.



ep up your own skill with the facts and figures of your trade, Audels cebanics Guides contain Practical Inside Trade Information in a andy Form, Fully illustrated and Easy to Understand, Highly Ensecd, Check the book you want for 7 DAYS FREE EXAMINATION. Send No Money, Nothing to pay postman,

ORDE

Check NOW!

LARGERT NOTE COLOR TO SERVICE THE NAME OF THE SERVICE OF THE SERVI

Start the Easy Payments If Satisfied MAIL THIS TODAY

Occupation_____

mont Speedway was a "drag" strip. Schmitt's cycle was geared down for dig-out, not for maximum top speed.

As far as top speed is concerned, a singlemotored, American-made Harley-Davidson bike recently hit 170.13 m.p.h.

Ken Kielar, Chicago

Now He Likes His TV Better

Just a word to report how pleased I am with the television remote-control-and-listen-



ing device I assembled in accordance with the data outlined in the article titled "Television as You Like It" [May, p. 216].

KARL T. DREHER, Denver

Lightning-Fast Reader

You reported in June [p. 159] that George Murch of Denver University is capable of seeing 8,000 words per minute pass before his eyes and then score 100 in a test on the subject he has read. That's a lot of literature. It's 133.333 words per second. That's better than "amazing." I just don't believe it!

DAVID K. MILLER, Trenton, N.J.

Our information on Mr. Murch's feat came from the usually reliable United Press. Obviously, nobody but an electronic brain can read 133.333 words a second-one at a time. But the Air Force, among others, has found that people can be trained to read very rapidly by taking in a great many words at each glance.

Taking Issue with an Artist

Just love that Gus Wilson. His combination of kindness and know-how makes him the Rolls-Royce of mechanics. The illustrator of the June story [p. 160] must have forgotten his Model A Fords, however. They had no oil-pressure gauge. Gus couldn't have made his deduction on the Model A in the picture.

JAY MONROE, Flushing, N.Y.

How do you know that the old boy in the story hadn't bought an oil-pressure gauge from a mail-order house?

You Can

Look Over

Any Guide

Own Home

In Your

"Here's your MOST PRACTICAL way to get an education!"

says I.C.S. graduate T. W. PUTNAM Retail Sales Promotion Mgr. Fresh Milk & Ice Cream Division Carnation Company

"From my experience, it appears that the most practical way to get an education is to study with I. C. S.

"First of all, you study alone, with no distraction from others. You lose no time in travel. Your home is your schoolroom.

"Second, you must know your subject-I. C. S. insists on this.

"And third, the lesson you study this evening is put to use the next day, increasing your income, your prestige and your importance to the firm you represent.

"I have recommended I. C. S. to many men. And all those who followed my advice have advanced in position and income."

Will you be next to consider Mr. Putnam's recommendation? Here's the coupon to mark and mail!

1. C. S. is the oldest and largest correspondence school. 277 courses. Business, industrial, engineering, academic, high school. Direct, job related. Bedrock facts and theory plus practical application. Complete lesson and answer service. No skimping. Diploma to graduates.

For Real Job Security-Get an I. C. S. Diploma!



3 FREE BOOKS-

(1) 36-page pocket guide to advancement, a gold mine of information on "How to Succeed." (2) Complete catalog outlining opportunities in your field of interest. (3) Sample lesson demonstrating I. C. S. method. Mail coupon NOW!

I. C. S., Scranton 9, Penna.

INTERNATIONAL CORRESPONDENCE SCHOOLS BOX 7687-N, SCRANTON 9, PENNA. (Partial list of 277 courses) ortunity booklet about the field BEFORE which I have marked X (plus sample lesson): Without cost or obligation, send me "HOW to SUCCEED" and the opp RAILROAD Art Brakes | Car Inspector Diesel Locomotive 1 Locomotive Engineer 3 Section Foremen 5 TEAM AND 6 Donisation Connecting Diesel - Electric Light and Power 1 Stationary Fireman Stationary State Engineering TEXTILE Carding and Spinning AVIATION Aeronautical Engineering Jr. Aircraft & Engine Mechanic BUSINESS CIVIL, STRUCTURAL ENGINEERING LEADERSHIP BALL BOAD ARCHITECTURE and BUILDING CONSTRUCTION Foremanship Industrial Supervision Leadership and Organization Personnel-Labor Relations MECHANICAL AND SHOP The First Welding and BUILLING CONSTRUCTION AND Conditioning—Refrig. Building Contractor Building Maintenance B ENGINEERING Civil Engineering Construction Engineering Highway Engineering Reading Struct. Blueprints Sanitary Engineering Structural Engineering Structural Engineering Surveying and Mapping DPA FTIME Architectural Dratting Electrical Drafting Mechanical Dratting Mechanical Dratting An. GasHead Tin Head Tin Hea TEXTILE Carding and Spinning Cotton, Rayon, Woolen Mtg. Flinishing and Dyeing Loom Fixing Textile Designing Textile Enging Warping and Weaving Electrical Drafting Mechanical Drafting Mine Surveying and Mapping Ship Drafting Structural Drafting ELECTRICAL Electrical Engineering Electrical Maintenance Leterting Contracting MISCELLANEOUS Domestic Refrigeration | Electrician | Lineman | HIGH SCHOOL | Commercial | Good English | High School Subjects | Mathematics MISCELLANE Domestic Refrigerat Marine Engineering Ocean Navigation Shipfitting Short Story Writing Telephony ____A.M. to P.M.__ City Canadian residents send coupon to International Correspondence Schools, Canadian, Ltd., Montreal, Canada. . . . Special tuition rates to members of the U. S. Armed Forces. Occupation

DRAFTSMEN



LEARN AT HOME IN SPARE TIME (or at college in Chicago)

Check the want ads in any newspaper—SEE the big-pay opportunities open to you as a draftsman. What's at home—quickly, easily! No special talent needed. Get complete, step-by-step Chicago Tech lessons in the mail, spend a few pleasant hours studying each week. In a short time you'll be a well-trained draftsman, ready to take your pick of many good jobs. Act now!



FREE INFORMATION—MAIL COUPON TODAY! Get FREE TRIAL LESSON plus infor-mation about C.T.C. practical training. Learn what successful Chicago Tech graduates say about high pay and oppor-tunities in drafting. No charge, or obli-

CHICAGO TECHNICAL COLLEGE

K-222 Tech Bidg., 2000 So. Michigan Ave. Chicago 16, Illinois Mail me FREE Lesson with information about big oppor-

Address.....

........Zone....State......

The following are the usual preliminary steps to take toward patent protection.

Make a disclosure of your invention; sign, date and have this document witnessed by two or more people who understand your invention; authorize your registered patent attorney or agent to conduct a preliminary search among previously granted U.S. patents for similar types of invention; secure a report on the probable patentability of your invention and a recommendation of the further course to take.

We shall be glad to send you without obligation our instructive booklet, "Patent Protection for Inventors" and our "Evidence of Invention" disclosure form.

VANS & CO. Merlin M. Evans REGISTERED PATENT ATTORNEY MERLIN BUILDING, WASHINGTON 6, D. C.

PUMP WATER *FAS* GPH. 420 GPH at 75' high or 1600 GPH from 25' well. Sturdy, GPH, 420 GPH at 79 nigh of 1600 GPH from 25 week. Soundy.

rustproof Alloy Metal S. Ki Blade impeller. Uses any % to ½

H.P. Motor. Will not leak or clog. Fits any garden hose.
Immediate money back guarantee. Send Check, Money \$ 95
Order, or C.O.D.

Order, or C.O.D.

RRIGGTE, FILL TANKS, DRAW WELL WATER, Heavy duty #8 Pumps
7000 GPH. 1000 GPH 75' high — 3000 GPH from 25' well. Resist
proof Alloy Metal. 8 bade impeller, 1' intel — 1' outlet. Standard
Pipe Threaded, Money back guarantee. Send check, \$ 1 95' Money Order, or C.O.D.

Money Order, or C.O.D.

Must.

Contained The American Contained The Contained The

Free Catalogue - Gear Pumps - Deep and Shallo

MOORE MANUFACTURING CO.

INVENTOR

I shall be pleased to furnish you, upon request, with information relative to patent procedure-without any obligation on your part.

PATRICK D. BEAVERS Registered Patent Attorney

937 Columbian Building, Washington 1, D. C. _______



PATENT INFORMATION INVENTOR'S RECORD

GUSTAVE MILLER

REGISTERED PATENT ATTORNEY ASSOCIATE EXAMINER U.S. PAT, OFF, 1922-1929

Patent Attorney & Advisor U. S. NAVY DEPT, 1930-1947 PATENT LAWYER

Whether an invention is patentable can be substantially determined by a search of the U. S. Patent records. Without obligation, write for information explaining the steps you should take to secure a patent.

JOHN N. RANDOLPH Registered Patent Attorney

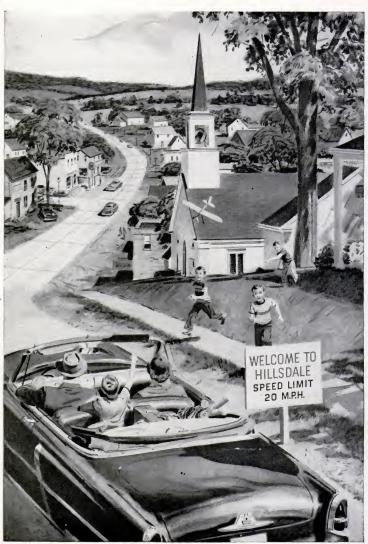
205 Columbian Building Washington 1, D. C.

PROTECT YOUR INVENTION BY PATENT. FREE S. SEND FOR "INVENTION RECORD" FORM AND "PATENT INFORMATION EVERY INVENTOR SHOULD HAVE".

MILLER REGISTERED PATENT ATTORNEY

WOOLWORTH BLDG., 35th FLOOR, 84C NEW YORK CITY





Reading and heeding speed limit signs can help you...

save up to 40% on your auto insurance!

Read how careful drivers get top-notch protection at rock-bottom rates with

STATE FARM MUTUAL

Do you obey traffic signs like the one in the picture? If you do, here's good news! You can probably qualify for membership with State Farm Mutual—the "careful driver insurance company."

And as a member, you can save on your auto insurance—save as much as 40% of the cost of comparable protection with other good companies!

State Farm Mutual, you see, deliberately aims to insure only careful drivers. Our experience over the past 32 years proves this holds accident costs to a minimum. And we pass the savings back to our members in the form of rock-bottom rates.

Any one of our 7,000 State Farm Mutual agents can tell you exactly how much you can save. And he can fill you in on the many other benefits of State Farm insurance—like our con-

venient semi-annual payment plan. And our speedy, efficient "day or night" claim service.

To find the agent who lives nearest you, look under "State Farm Insurance" in the yellow pages of your phone book, or write: State Farm Mutual, Dept. I-13, Bloomington, Illinois.

Can	You	Qual	lifv?
Call	Ivu	Qua	LLL.Y &

State Farm aims to insure careful drivers only.

Drivers who can be counted on to:

- Obey speed laws
- ☐ Be alert for emergencies
 ☐ Make full stop at stop signs
- ☐ Heed crossing signals
- Always signal stops and turns
- Avoid passing on hills or curves
- Avoid mixing alcohol and gasoline
- ☐ Yield pedestrians the right of way

STATE FARM MUTUAL



FREE TO MEMBERS!

Ask your agent for your new State Farm insignia (like above) in bright red headlightreflecting Scotchlite. Display it proudly on left rear car bumper to identify yourself as "careful driver, soundly insured". .. to provide emergency reflection when parked or if taillight fails. "the careful driver insurance company"

State Farm Insurance is written only by the
State Farm Mutual Automobile Insurance Co.
and its wholly owned affiliates:

State Farm Life Insurance Company State Farm Fire and Casualty Company

Home office: Bloomington, Illinois. Field claim offices in 315 principal cities. 7,000 agents in 40 states, District of Columbia, and Ontario, Canada

Hear "Jack Brickhouse Sports News" Saturdays and
"Cecil Brown News Commentaries" Sundays over Mutual Stations;
Check local radio listinas.

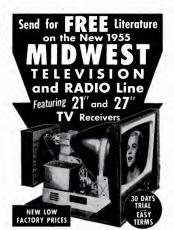


TABLE MODELS . CONSOLES . CHASSIS

For its 35th Anniversary Year Midwest offers sense For its 35th Anniversary Year Midwest offers sensa-tional values in big-pleture VIIF or All-Channel TV receivers in your choice of mahogany, walnut, or the property of the property of the property of the long-distance reception. Also new 1955 Midwest 5-band Series 16 radios and radio-phonographs. Buy your new Television or Radio receiver direct from the Midwest Factory on 30 Days Trial ... Easy Terms ... and at LOW FACTORY PRICES!

SEND THIS COUPON ON 2¢ POST CARD FOR NEW 1955	MIDWEST RADIO & TELEVISION CORP. Dept. 241, 909 Broadway, Cincinnati 2, Ohio
FREE MIDWEST LITERATURE	ADDRESSZONE_STATE

DEGREE IN 27 MONTHS

Big Demand for Graduates

AERONAUTICAL, CHEMICAL, CIVIL, ELECTRICAL, MECHAN-ICAL and RADIO ENGINEERING linc. TV and Electronics1.

Hundreds of young men are carning B.S. ENGINEERING DEGREES annually in this recognized institution—year around operation, New terms start quarterly. Many students earn a major part of their college expenses in this large industrial center.

Low tuition. Competent instruction. Thorough, intense, prac-tical program. Mulern, web-requipped laboratories incinding new physics laboratory and modern wind tunned, individualized instruction emphasized.

Gov't approved for G.L.'s, Engineering preparatory courses, Students from 48 states and 21 foreign countries, Enter September, December, Marcia, June, Send coupon for free catalog and full information, Eurofi now.

--- SEND COUPON TODAY ---

INDIANA TECHNICAL COLLEGE 684 E. Washington Boulevard Fort Wayne 2, Indiana

Please send me free information on B. S. Engineering degree in 27 months as checked. ☐ Aeronouticol, ☐ Chemicol, ☐ Civil, ☐ Electrical, ☐ Mechanical, ☐ Rodio-Television.

Nome	
Address	

26	POPULAR	SCIENCE

7 x 50 \$ 2 9.95

New, improved, superb, lighter binoculars that are easier to hold, easier
316. x 192 has tremendous light
liant, crystal elever images. ALL brilliant, cry



BUSINESS!

Earn \$64.00 EXTRA a Month on Just 5 Sales a Week!

Gointo business without spending a cent! My powerful FREE Sales Kit makes! teasy to take orders for Manon's fast-selling line of leather Jucket. Your Amon's fast-selling line of leather Jucket. Your from you, paying you like 'Profits on each order! for you, paying you like 'Profits on each order! Just-sell 5 of our popiner Fleece-fined Leather jack-ets a week, to make Sel extra income a month! Just-sell 5 of our fast of the Sales of the Sales Sales (N) on, Gabardine, Wood. ... take orders for Lift line shoe styles for men, women, including poping the Accupited were discovered to the Sales Sales (N) of the Sales (N) of the Sales Sa



MASON SHOE MFG. CO., Dept. MA 391 Chippewa Falls. Wisconsin

Complete course 4.95

Locksmithing AND KEY Now Made Easy! Practical up-to-

teaches you how to pick locks, de-code, ice, etc., New self-inderraction leasn for every bandyman, honorous wer, earnester, etc., New self-inderraction leasn for every bandyman, honorous etc. etc., New self-inderraction description of experiments of the self-inderraction description of experiments of the self-inderraction description of the self-inderraction description of the self-inderraction of the self-inderractio

TASOPE PHOTO-ENGRAVING PLANTS



Establish your own profitable PHOTO-EN-GRAVING business. Make cuts for newspapers, printers, and odvertisers. Moke etched name plotes, ploques etc. Instructions furnished, no experience necessary. Sold direct from foctory since 1931. First five hundred cuts sold locally or by moil will pay for plant and pay you well for your time. Write for FREE catalog. TASOPE, DEPT. PS-8, AURORA, MO.

High School

at Home

MANY FINISH IN 2 YEARS

No classes. No time wasted going to and from school. Progress as fast as your time and abilities permit. Standard H. S. texts supplied. Thousands enroll each year in this 57-year-old school. Send for FREE descriptive booklet.

AMERICAN SCHOOL, Dept. HC-46

Drexel at 58th St., Chicago	
Without obligation, please send	FREE descriptive booklet.

i	Name.									,																					٠												
i	Name.	• • •	•	•	• •	•	•	٠	٠	•	٠	٠	•	•	•	•	•	•	•	•	•	٠	•	٠	•	٠	•	•	٠	٠	٠	•	•	•	•	•	•	•	•	•	•	•	

Address Canadian Residents: Complete Canadian Course Available. Write American School, 1610 Sherbrooke St., West, Montreal.



Dejected is Dunkle –
it is his dreadful loss
That he gets nothing more
from car polish - but gloss.

So when it starts blowing, he puts on a duster And reclines on the hood to keep dust off the lustre.



How different, Stan Stauncher! His enlightened selection Is an easy-on wax that

s an easy-on wax that gives <u>rock-hard</u> protection!

For Bodygard forms such a shield against scratches That his car is as safe as if stowed under hatches!

(He feels extra breezy, 'cause the job is so easy.)

MORAL: Use New Liquid Bodygardthe first, easy wipe-on wax that protects your car with this rock-hard finish. Protects 9 times longer than skimpy-shine polishes.

YOU CAN'T SHINE DIRT, SO CLEAN YOUR CAR FIRST.

Every car must be cleaned before it's waxed. Simoniz Liquid Kleener cleans better, faster.



True Simoniz Quality in a Liquid Car Wax. Only 98 s



even if you don't know a single note now!

NOW H's EASY to learn ANY Instrument. No bottom exercises, the set of the second source of th

FREE 36-PAGE ILLUSTRATED BOOK

-just send tills ad, with your name and address filled in below, to: U. S. School of Music, Studio 158, Port Washington, N. Y. (No obligation, no salesman will



Name....

Address ...

STANLEY CUTTING TOOL Reg. \$1.00 Model

Yours as a gift with free trial of amazing new book BASIC HOME CARPENTRY. Over 300 pages, 500 "howta" plans and pictures. Rush card taday! If delighted, pay only \$2.95 plus pastage—otherwise return book and owe nothing. Either way, keep the Cutting Taol free! WM. H. WISE & CO., Inc., 50 W. 47th St., Dept. 808, N. Y. C. 36



Quit being a BAG of BONES Weakling Like | Was -

IN TO MINUTES OF YOU Can DO ALL I did! I gained 25 Terrific Lbs. of HANDSOME POWER-PACKED MUSCLES all over!

> I Improved My HE-MAN Looks 1000%

I WOR NEW STRENGTH-POPULARITY NO! I don't care how skinny or flabby you are. I'll make you OVER by the SAME method I turned myself from a wreck to the strongest of the strong. DEVELOP YOUR 520 MUSCLES.

YES!You'll see INCHES of mighty muscles added.
From head to heels you'll gain SIZE, POWER, SPEED.
HOW YOU CAN WIN A BIG 15" TALL SILVIB (OF and \$100 as 1 just did

LAST CHANCE COUPON - 5 COURSES FREE! Press mail is me prepaid PREE Jewett's Photos ing Mex. a Muscle Meter, plus all 8 Muscle Building in is Second a Mighty Ne Max." ENCLOSES FIRD 10s Ne

Searce grather postings stamp, as libustrated in Static Pitch side representation of 30 all-different United States pitch century, valuable 85, 00 stamp, etc.; PLUS packet beautiful Commemoratives including particular to the static pitch side of H.E. HARRIS & CO., US49 Transit Bldg., Boston 17, Mass.

I've been nicknamed the "Australian Teddy-Bear". What's my real name? (Clue: it begins with the letter K)... Send answer with your name and "E-se Australian Packet of 25 bird, letter K)...Send answer with your n address for Free Australian Packet of address for Free Australian Packet of 25 bird, animal and commemorative stamps including new Coronation, Also, big illustrated U.S. Catalog, All FREE for 3c stamp to cover postage. Approvals. H. E. HARRIS & CO., 720 Transit Bidg., Boston 17, Mass.



NOW! START MAKING MONEY IN RADIO - TELEVISION

THRU AMAZING 30-DAY INCOME PLAN!

Send for FREE BOOK, FREE LESSON and FACTS on amazing new home training plan! RADIO-TELEVISION TRAINING SCHOOL INC. Dept. PS 8, 5100 South Vermont, Los Angeles 37, California

BUILD LUGGAGE AT HOME WE SELL YOUR PRODUCTS!

Only New Home Money-Making Plan in Years! Only New Holm Worky-making Fig. 11 hears; Make Lugage and eases for traveling, bhotographers, musicians, salesmen, electronics, tools, portables, 1001 other tems, the salesmen, electronics, tools, portables, 1001 other tems, 11st, We supply complete instructions—verything, Write for free details and Business Plan, ABARSI CASECRAFT Dept. H-8, 805 W. Sunset Blid, Los Angeles 12, Calif.

CASTING SECRETS

NO EXPERIENCE. VERY LITTLE CAPITAL NEEDED



PLASTIC ARTS STUDIO MUNCIE, INDIANA

PAYS BIQ SEND FOR FREE, BIQ, ILLUSTRATED CATALOG, NOW! Graduates report for the payon of the payon business quickly. Men, women of all nines, women of all nines, and the payon business quickly. Men, women of all nines, and the payon business quickly payon business and payon business quickly payon



WEAVER SCHOOL OF REAL ESTATE (Est. 1936)
Suite 300 Law Bldg. Dept. PS Kansas City, Mo.

START AS HIGH AS \$4205.00 A YEAR

Thousands of application of the state of the

FISH'S M-1 CARBURETOR TAKES ACID TEST WITH FLYING COLORS!



ONLY 17 PARTS--ONLY THREE MOVE, no choke, jets, idling system or accelerating pump.

5,000 OF THESE MIRACLE CARBURETORS are undergoing grueling international tests by the inventor's powerful ever-growing organization for developing, patenting, manufacturing and marketing new inventions. The overwhelming tide of comment now flowing in tells an amazing story of astounding Carburetor performance giving the direct lie to those who cast doubt upon this truly great endeavor.

HERE ARE REPRESENTATIVE EXCERPTS FROM THE HUNDREDS OF REPORTS COVERING EVERY POINT OF CARBURETOR PERFORMANCE:

1

ACCELER ATION

It '53 FOR have ch

HILL CLIMBING

'53 BUICK SUPER—It exceeded my expectations by far. It eliminated all the lugging noise of my engine and exceeded the standard Buick carburetor in acceleration. The mileage has increased more than the 30% guaranteed. I'm very happy with it.—MySt. Partial Wagner, Denison, Texas.

'52 OLDS 88-We found after testing with different cars the Carburetor performs beyond what you have said. I have one of them on my Olds now and have driven it several thousand miles. We are completely satisfied in all respects.—Louis Goulette, Seattle, Washington, '33 FORD 6—1 am sold on the power of your Garburetor as, law checked it on a 30% grade in high gaps and she crawled up at 10 mph and picked up speed without hesitation or a sputter. It also wept up in overdrive at 10 mph and I was putter with the second of the second

'51 MERCURY—We went over some pratty high mountains, one 9,000 feet high, the elevation was 6,000 feet in 10 miles. We had all the necessary power and gas mileage increased by about 30%.—Ruduloh Ellis, Artesia. New Mexico.

V

MILEAGE

'51 CADILLAC—The test was taken under very close cheek, and I got a reading of 28.63 per gallon.—Tony Martin, Fresno. California.

'51 WILLYS—What a surprise. I just could not believe it. Improvement in performance is terrific, and fuel economy is incredible. I figure I'm getting 30 to 35 around town and 38 to 40 on trips.—Arthur K. Ingersoll, Jackson, Michigan.

V

PERFORMANCE

'49 BUICK ROADMASTER — Acceleration greatly improved, smoother performance and averaged 18½ mpg while the stock carburetor averaged only 14 mpg, Installed second Carburetor on '53 Packard with 327 cuble inch engine, performed equally as well—DeArmond Leigh, Ashland, Oregon.

'52 PACKARD—Your Carburetor is a wildcat in disguise and my car using REGULAR GAS performs better than my stock one did when the car was new.—'B. E. Carney, Seattle, Wash.

V

IDLING

'53 MERCURY—I had the M-1 set for lean and it just flew; at idle I had it down to 355 RPM; the lowest I got before was 475 RPM. On starting from traffic lights, the take-off was "out of this world."—W. Stein, Bronx, New York.

'49 FORD V8 ½ Ton Truck—It idies as it hadn't since I had the truck and it takes off like a roadster when I romp on it. —Murray M. Durham, KFRG, Fairbanks, Alaska.



STAPTING

'51 CHRYSLER—Starts fine, ecoelorates like a scalded cat. 40° below when I started it. The tires froze so that the flat spots in them thumped. Don't let anyone tell you that cold stops a Fish M-1.—L. A. McMahan, Badger, Minnesota.

GADILLAC—Terrific acceleration. Has overcome owner's former complaint of not starting easily when hot.—Paul Daiberg, Kent, Washington.



SPEED

'52 OLDS 88-We went from standing to 110 miles per hour with very smooth performance. - Harold Duncan, Lansing, Michigan

'50 LINCOLN—I intend to put a "Zip Plus Mileage" sign on the back of my car because that's all people will see of me on the highway.—George Hotchkiss, San Francisco, California. V

City .

SMOOTHNESS

'52 FORD V8-The smoothness of the motor is amazing.-Gordon B. Nelson, Los Angeles, Galifornia.

'52 OLDS 88—They all remarked how the Hydromatic worked so smooth and the continuous pick-up with no flat spots.—A, C, Kusick, San Jose, California.

In the U. S. are 48,155 car and truck dealers; 72,452 repair shops; 120,007 automotive retail outlets and 188,253 gas stations. Practically no one in this virgin field understands the M-1 Carburetor. Service must be provided before sales can be made in volume. Needed Now are men with the know-how, brains and guts to tackle this tremendous task. Moneywise the stakes are high, and when the M-1 Carburetor service is completed, other inventions—yours perhaps—will be waiting for the

magic touch that our organization can furnish.

 You will find our story interesting. It's yours for the asking.

JOHN ROBERT FISH

P. O. BOX 1751, DAYTONA BEACH 6, FLORIDA

Please send information on your Carburetor and your organization

Address _____

_____Zone ___ State _____

Electro-Magnetic DORMIPHO

A Great Scientific Discovery

SCIENCE FICTION TODAY — ASTOUNDING

REALITY!

Revolutionary Multi-Purpose Invention for

 Faster Learning e Simplified Home Recording



search for the perfect multi-purpose machine. Would you like to increase your rate of learning 20 % or 0.5 by making use of perfords we handled the performance of th

Find Out About Electro-Magnetic Dormiphone
Proof of what the New ELECTRO-MAGNETIC DORMIPHONE can
de for you is fully set forth in a FREE BOOKId. "A New Dimension
in Learning." Write today, DORMIPHONE, MODERNOPHONE,
INC., 282-08 RCA Building, N.Y. 20.

Mail Coupon New for FREE Booklet, "A New Dimension in Learning."

MODERNOPHONE, INC. (Dormiphone Div.) 262-08 RCA Building, N.Y. 20, N.Y. Gentlemen; Send me your PREE Booklet "A New Dimension in Learning."

If under 18, check here for Special Booklet A.

City.

City Zone State
My main interest in Dormiphonics is for Speech Improvement
| Learning a Language Enjoyment Home Recording



BUSHNELL Binoculars

Free/ Catalog & Book Dept. P88 43 E. Green Pasadena, Calif.

IT'S DANGEROUS (DANGEROUS) TO PAY LESS For "Family-Safe" year AFTER YEAR, POPULAR SCIENCE BRINGS US TO YOU



FREE This Pictured Tire Ash Tray with your name with two or more tires THESE ARE NOT RECAPS.

"Standard" grade used tires.....

GOODYEAR FIRESTONE U.S. & FREE TUBE

MERICA'S MOST "UNLIMIT "UNLIMITED" LIFETIME GUARANTE RESPECTED WAITTEN UNLIMITED LIPETIME GUAR MON JUST 18, 20 - 34 months - We will adjust - regardless or willower. Any Time has been seen as the seen and the seen as the seen a

OTK 7.60 MUD-0818 750-20 super 20 mos. \$10.20 rugged 34 mos. \$12.50 900-16 super 20 mos. \$10.20 rugged 34 mos. \$13.20

4th" TIRE 0 32x6TK 0 700-20TK 0 750-20TK 0 825-20TK 0 900-20TK 0 1000-20TK

BLATT

one chance to treat you right." Mort Blatt, Mgr; Feithfully serviorists, hospitals, schools & churches since 1917.

ATT

Philia., Pa., 11th and Spring Garden St.
Miami; Fla., 2827 N.W. 7th Ave.
from our store nearest you, 5cnd Ck, or M.O. and this ad
Thousands of shipments RUSHED all over the world.

Write 120 words per minute Age no obstacle—Lowest Cost

Age no obstacle—Lowest Cost Famous SPEEDWRITING shorthand. No symbols; no machines; uses ABC's Eastest to learn and use. Fast prep-aration for a better position. Nationally used in leading region of the cost of the cost of the cost of the cost 120 words per minute—50% FASTER than Civil Service requirements. Over 250,000 taught by mail. The very low cost will surprise you. Typing available 3 list Year. Schools in over 400 cities in U.S. Cannada. Cuba. and Hawail. WRITE FOR FREE BOOKLET TO SCHOOL OF

Dept. 2608-4, 55 W. 42 St., N.Y. 36 (R)

33 BOAT PLANS Build the Boat of Your Dreams t any type of boat-



Your Big Opportunity

34-iesaba course on proved, up-to-date, profitable odds. Amazing treasure-house of the best maplans and practices. How to start your own maplans and practices. How to start your own maplans are proving more and more profitable month aftendor-making PACTS. Full price only \$8.95. To COD plass postars. Nothing more to pay, 50 COD plass postars. Nothing more to pay. 50 COD plass postars. Nothing more to pay. 50 COD plass postars. On the province of the province

TAN SKINS, MAKE UP FURS

ing trophies, decorate non-ing KROME LEATHER, tan and mal-line krome in the control of the control o FREE BOOK

It's Now Free. Send post card. State your AGE. N. W. SCHOOL OF TAXIDERMY, DEPT. 2608.



national camera repair school-DEPT, PS-8 ENGLEWOOD

book

Free to new members of the International Traders Guild-many unusual, useful products from France, Japan, Germany and other ucts from France, Japan, Germany and other foreign lands, and trade bulletins listing hundreds of import bargains to sell at high U. S. prices. Also requests from overseas buyers for U. S. exports. Opportunity, men women, profitable, world-wide, mail order business at home; or travel abroad; no cap-business at home; or travel abroad; no cap-ltal needed. 2,000 members in 42 countries. The successful year. FREE details. Mellinger Co., Dept. (2007); Westwood, Los Angeles 24, Csliff

IDEAL LAWNMOWER SHARPENER BOOST YOUR INCOME You can earn extra cash with the

Model 300 Ideal Lawnmower Sharpener. Used and recom-mended by leading manufac-turers and service shops, the Ideal has everything you need, nothing else to buy. Grinds reel and bed knife, also recon-ditions. Get started now in this highly profitable busi-ness. Write for catalog to-

The FATE-ROOT HEATH Co. Dept. PS-8, Plymouth, Ohio

If employed, start part time, Alert dealers can gross 85 hourly profit on own service plus 83 on EACH serviceman, Clean, retive, moth-proof rugs & upholstery on location, No shop needed, Services nationally advertised. Repeat customers. Easy to learn, We locally train and assist you, Quickly established. Easy terms, Send today for FREE booklet, No obligation. Easy terms. DURACLEAN CO., 4-188 Duraclean Bldg., Deerfield, III.

Writing abort stories, articles on business, sports, habitos, trov-shop cords, local, etch and church self-thiss, etc., will consider you earn extra money. In your own home, on your own time, the No York Copy besk Method teaches you how to write the way newspan your considerable of the work of the work of the work of the whether you possess the fundamental cualities essential to successfully. You'll enjoy this test, Write for it, without cost or obligation.

NEWSPAPER INSTITUTE OF AMERICA

SUITE 5724-M, ONE PARK AVENUE. NEW YORK 16, N. Y.



LEARN LOCKSMITHING

Learn this fascinating, profitable trade from experts in your spare time at home! Age or physical handicap no disadvantare. Year around, steady hoome. Full or part time. Prac-tical, illustrated lessons. You can make money even while learning! All materials and special tools supplied without extra charge.

LOCKSMITHING INSTITUTE, Dept. PS-56
PARK AVENUE RUTHERFORD, N.
Lic. by N. J. State Board of Education
Approved for Veterans

NEW U-238 geiger counter-world's smollest, most sensitive uronium locotor. Ideal for prospecting even on hunting, fishing trips! (Full line of mineral and metal

request. (Dealer inquiries welcome.) GOLDAK COMPANY 1544 W. Glenoaks Blvd., Glendale, Calif.

POWER MOWERS & KITS LOW FACTORY PRICES DIRECT TO YOU nd 4 Wheel Kits, complete. Parts precision inished, ready to use, Write TODAY for Free Plans, Low Prices, Parts List and Guarantee.

lon and money back guaran-described in color folder.

FRFF

booklets on

TRIANGLE MANUFACTURING CO., Box 5-32, Fort Scott, Kansas

Get into RADIO-TELEVISION **ELECTRONICS** by Shop-Method **Home Training**



GOOD JOBS AWAIT THE TRAINED RADIO-TV TECHNICIAN! Business of Your Own . Broadcasting . Radio Manufacturing, Sales, Service • Telecasting • Television Manufacturing, Sales,
Service • Laboratories: Installation, Maintenance of Electronic Equipment • Electrolysis, Call Systems • Theatre Sound Systems, Police Radio • Garages: Auto Radia Sales, Service • Sound Systems, Telephone Companies, Engineering Firms, etc.

WE BRING NATIONAL SCHOOLS TO YOU! There is a place for you in the great Radio-Television-Electronics industry when you are trained as National Schools will train you at home! OUR METHOD IS PROVED BY THE SUC-CESS OF OUR GRADUATES SINCE 1905.

YOU RECEIVE PARTS for Signal Generator, T.R.F. Receiver, Audio Oscillator and Superheterodyne Receiver, plus professional Multitester shown above. No extra charges. EARN WHILE YOU LEARN-we show you how!

APPROVED FOR G. I. TRAINING RADIO FELEVISION FREE SAMPLE LESSON RADIO-TV BOOK & SAMPLE

LESSON!

MASTER ALL PHASESI Get Master Shop-Method Home Training from an Established Resident Technical Trade School with its own Training Shops, Laboratories, Studios-almost 50 Years of Successful Experience in Training Ambitious Men.

IATIONAL SCHOOLS

Technical Trade Training Since 1905 LOS ANGELES 37, CALIFORNIA

In Canada: 811 West Hastings Street, Vancouver, B. C. BOTH HOME STUDY AND RESIDENT COURSES OFFERED

AIL	NOW	TO	OFFICE	NEAREST	YOL

•			SCHOOLS, Dep		•
000 S. FIGI			OR		OLK STREET
Please	rush	FREE	RADIO-TEL	EVISION	BOOK &

FREE LESSON. No obligation, no salesman will call. BIRTHDAY _____19

ADDRESS ZONE STATE ☐ Check if interested ONLY in Resident training at Las Angeles.

VETERANS: Give date of discharge ___

BIG VALUES IN LATEST TV-RADIO SUPPLEMENT



FREE send for it

Everything for Experimenters, Builders, Amateurs, Servicemen, Hi-Fi Fans

Send for our latest bargain-packed Supplement listing big values and new releases in TV accessories, cus-tom chassis, High Fidelity systems and components, P.A. systems, re-corders. FM and AM radios, Amateur supplies, test instruments, builders' kits, electronic parts, tubes, tools and books. Make your selections from the world's largest stocks of electronic supplies at lowest, money-saving prices!



FREE Send for Supplement

ALLIED RADIO

Success Requires Training! R CONDIT

This great, modern industry is alive with opportunities for trained men. Installation, maintenance and servicing of home and industrial equipment is a well-established, paying trade and business. Now mechanically inclined men can get practical instruction in spare time at home. plus quick shop practice at U.E.I. (founded 1927).

IMPORTANT FACTS FREE — Write today

ese interesting opportunities without oblig

UTILITIES ENGINEERING INSTITUTE, Dept. M-8





our proven RATIONby our proven RATION-AL System—the easiest way to learn quickly PRACTICAL Spanish, as pronounced and used in Latin America, Forget the grammar; it is like reading an absorbing story, Low tuition cost.

NORTH AMERICAN SCHOOL—HOLLYWOOD

SEND FOR FREE BOOK-NO OBLIGATION

rth American \$ hooi, Dept. P5-3. x 27606 Hollywood 27, Calif. nd me information on your famous Rational System

37 POPULAR SCIENCE

DIFFERENT STAMPS

With 8 Exciting Topical Groups duddining allering solar destar alleren Januarian

This valuable imported collection includes the NEW CROATIA U.P.C. SET of 4, governous Indonesia U.P.U. SET of 4, governous Indonesia U.P.U. Collection of the collection of th

A total 6322 all different stamps cataloging more than \$6.50 for only 25c, to introduce our FAMOUS BARGAIN APPROVALS, Money back if not delighted. FIREE: 40-PAGE STAMP DICTION. FREE: 40-PAC

STAMPEX CO., 116-RM Nassau St., New York 38, N. Y.



Men afflicted with Bladder Trouble, Getting Up Nights. Pains in Back, Hips, Legs, Nervousness, Dizziness, Physical Inability and General Impotency send for our amazing FREE BOOK that

tells how you may correct these condi-tions and have new health and Zest in Life. Write today. No Obligation. Excelsior Institute, Dept. B-5, Excelsior Springs, Mo.



ILLUSTRATED CARTOON BOOKLETS

Men, here are the small illustrated cartoon booklets of comic characters they're talking about. 20, all different, (and other offers) sent for \$1 post-paid. No C.O.D.

GAY SALES, 448-L N. Prior, St. Paul, Minn



The Gem Maker comes complete with all nece The Gem Maker comes complete with all sure equipment, including a super-charged dibtade for sawing, and all wheets for grinding, ing and polishing; also complete instruction complete equipment as shown, teas motor and belt, for only \$29.50, f.o.b, Burlington, Wisconsin. Write today for information and literature.

B & I MANUFACTURING CO. Burlington, Wis.



ELECTROPLATE

nickel, co opper

the sharp viewing: Price includes handsome ying case, Made in Japan, UNCONDITIONALLY for 30 days, if not satisfied return for immedia rs postpaid, C.O.D.'s require \$2.00 deposit. UP CO., 9043 5 Western, C.416, Chicago 20, 0

All Tires BLACK WALL PRICE Famous 640 x 13 full price 640 x 13 full price 650 x 15 full price 670 x 15 ful

REE CATALOG

BRADLEY AVES

LASALLE Extension University, 417 So. Dearborn St. A Correspondence Institution Dept. 883T Chicago 5, III.

EN WANTED

Earn \$100 Per Week and up AUTO DIESEL

ade with a future—learn Auto-nanics in our shops. You learn on real equipment. Earn while Many of our graduates earn yeek and up. No previous exp

MECHANICS

NASHVILLE AUTO-DIESEL COLLEGE

WITH AN EDUCATIONAL INSTITUTION
Courses in ARTS AND SCIENCES Philosophy: Education: Letters:
Public Health; Medical Jurisprudence; Psychology: Sociology:
Public Health; Medical Jurisprudence; Psychology: Law; Bulnets
and Commerce, Accountage: No Science; Theology: Law; Bulnets
and Commerce, Accountage: No Science; Theology: Law; Bulnets
and Commerce, Accountage: Accountage: Accountage, Architectural, Manier, Indication, Petrolicum, Retries, Indication, Petrolicum, Retries, Indication, Send for free catalog.
Richies-Recognil Interpreted, 401-03, Shriefan Rc, Alcicage 40, Illinois
Richies-Recognil Interpreted, 401-03, Shriefan Rc, Alcicage 40, Illinois

Ball-Bearing JUVENILE WHEELS



12x1.75....\$3.45 INDUSTRIAL WHEELS

(Lug Base, Semi-Pneumatic tire)

\$\forall \text{2.5W} \cdot \forall \forall \forall \text{5.10} \text{2.00} \cdot \forall \forall \forall \forall \text{5.15} \text{3.2.00} \cdot \cdot \forall \forall \text{2.00} \cdot \forall \forall \forall \text{2.00} \cdot \forall \f Pneumatic tire and tube)

COMPANY JIM BROWN

BECOME A Mechanical Engineer



B. S. Degree in 36 months Mechanical Engineers hold re-



spected, well-paying, and highly interesting jobs in many fields of industry. You can prepare now . . . for a secure future and a well-paid

career as an engineer or engineering technician at the Milwaukee School of Engineering.

Choose from these courses at the Milwaukee School of Engineering

TECHNICIAN 12 to 18 month

ENGINEERING 36 months, Bachelor of Science Degree Mechanical Engineering

- with a majar in Design, Metal Fabricotion ar Piont Engineering. Electrical Engineering
- with o major in Electronics ar Pawer. SERVICE 6 to 12 months ● Electricity ● Heating ● Refrigeration ● Welding
- Radio and Television
 - Electronics
 - Electrical Pawer
 - Mechanical Technician · Air Canditioning
 - Welding

General preparatary cause - 3 months.

TERMS OPEN SEPTEMBER, JANUARY, APRIL, JULY Faculty of specialists. Over 50,000 former students. Annual enrollment from 48 states and 23 overseas countries. Non-profit. 51st year. Military, Practical or Academic training evaluated for advanced credit. Approved for Veterans Training. Write for details today.

MILWAUKEE SCHOOL OF ENGINEERING

MILWAUKEE SCHOOL OF ENGINEERING Dept. PS-854, 1025 N. Milwaukee Milwaukee I, Wisconsin Send free illustrated career booklets Radio-TV Bechanical Technology Electrical Technology I am interested in ______(name of course)

City____Zone____ If veteran, indicate date of discharge___

__State____

DIESEL MECHANICS NEEDED

BIG PAY - GOOD FUTURE

Virtually all heavy power equipment is rapidly going DIESEL, creating big paying, steady jobs—through good times or bad—for properly trained men.

Back during the DEPRESSION ... there was a big demand for Bailey Trained Diesel mechanics. We can OUICKLY TRAIN YOU to enter this

big pay field...no previous experience or special education necessary!

With our method of training you don't spend years pouring over books, figures, charts or graphs -you learn by repairing and operating big Diesel engines, under the guidance of experienced and friendly instructors.

This method of training gives you the experience and confidence that enables you to move right into the BIG PAY JOBS without spending years-as a mechanic's helper. We help you find part-time jobs while in school-full-time jobs after graduation. Mail coupon for complete information.

BAILEY Technical SCHOOLS

St. Louis 4, Mo.

TOWN.....ZONE.....STATE.....

MAKE EXTRA MONEY

AT HOME

LEARN HOW TO MAKE st-selling PLASTIC NOVELTIES FURNITURE JEWELRY SIGNS

There are RICH OPPORTUNITIES for MEN and WOMEN with "know-how" in Plastics. Interstate's new Plastics course tells and shows how to make hundreds of fast selling items out of Plastics. Gives complete training in fabrication, easting, lamination, molding, internal earving, etc., in simple, easy, step-by-step fanguage and pictures. Plastics and Fabricating Kits for 23 valuable Plastic items come with training at no extra cost. START A PLASTICS BUSINESS OF YOUR OWN. No other industry holds such promise for the future. You can make big money manufacturing novelties, toys, signs, etc., in your own home in spare or full time Don't wait! Learn NOW how Interstate's Plastic Training qualifies you for success in the Plastics field.

PLASTICS AND SUPPLIES FURNISHED

FOR 23 VALUARIE PROJECTS NTERSTATE TRAINING SERVICE

Dept. C-2-H Portland 13. Oregon



Start Your OWN ELECTRICAL APPLIANCE REPAIR BUSINESS

ush name today for FREE BOOK and special fur for getding Electronic Kit, Valuable sating Element Kits, Advisory Service and dustrated in tructions on new easy-payment an. Pay later from EARNINGS WHILE LARNING, Rush name today.

CHRISTY TRADES SCHOOL 4804 N. Kedzie, Dept. D-4201, Chicago 25 URANIUM



Write fer

Free Catalon

\$200 FOOL



FAMOUS DAN LURIE

50 lb. sef....\$ 8.48 | 150 lb. sef....\$20.48 100 lb. sef.... 13.98 | 200 lb. sef.... 25.98 Order by Mall; 50% with order, bal, C.O.D. Extra wts. 13c per lb., F.O.B. plant DAN LURIE BARBELL CO. 52-58 Bristoj St. Dept. 470 H Brooklyn, N. Y.

HOW TO RUN A RESTAUR ANT

Get into a Good MONEY-MAKING



Get into a Good MONET-MAKING
BUSINESS of Your Own!
Virtually a complete self-instruction course on
carteries, different self-instruction course on
the all-important farst about loases, licenses, voi
the all-important farst about loases, licenses,
real-censes, mean-supprings, etc. How to make
real-censes, mean-supprings, etc. How to make
make the could be your BIO chancel self-self-or
maranteed or money back Order 'Hlow to
plus postage, MELSON-MALL.CO., 210 s. Clinton
st. Opt. "AMVA", Chicago 6, ili.

Start a NEW BUSINESS!

or Add to your present Repair Business SHARPEN DULL PIPE WRENCHES PIPE TAPS & DIES

AISO MOTOR DRIVEN ROTARY HONE Write for Information J. C. MOORE INDUSTRIES

Box S 276, Fredonia, Pa.

Free Book on Arthritis And Rheumatism

HOW TO AVOID CRIPPLING DEFORMITIES

Explains why drugs and medicines give only temporary relief and fail to remove the causes; tells all about a specialized non-surgical, non-medical treatment which has proven successful for the past 35 years. Write for this 44-page FREE BOOK today.

Ball Clinic Dept. 36 Excelsion Springs, Mo.

I HAVE BEEN AVERAGING

\$25,771.16 gross in cash monthly

(Dec. \$31,362.14) for two years in mail order business storted very limited capital 1950. Because I can't cover even 1% of morket, I can supply you with merchandise, moiling lists, supply you with merchandise, moliting lists, soles letters, odvice bosed on experience. Can be operated on small scale by mora. Soles of the control of the P. O. Box 1715-HP, Dollas, Texas.

LEARN MEAT CUTTING AT NATIONAL Pay After Graduation



The steady dependable trade of Meat Cutting taught easily in 8 short weeks. You LEARN BY DOING under actual meat market conditions in big modern school at Toledo.

For beginners or men with experience. Get a Profitable store of your own. Remember, PEOPLE MUST EAT! Big pay jobs. Free employment help. Thousands of successful graduates.

Buying, cutting, percentage, pricing, advertising, selling, etc. A complete retail meat education. National School established over 30 years. Get National training NOW. Pay your tuition in easy weekly payments after you graduate. Get all the facts. Send coupon for FREE 52 page school catalog—TODAY. G.I. Approved.

National Sch	ool of Meat Cutting, Inc.	•
Dept. 51-H,	Toledo 4. Ohio	
Send me y Toledo in M Meats. No	our FREE school entalog on National Training a leat Cutting, Meat Merchandising and Self Service obligation. No salesman will call.	t
Name		
Address		
Clty	Approved for training Korean Veterans	



NEW YORK INSTITUTE OF PHOTOGRAPHY

Dept. 5, 10 W. 33 St., New York 1, N. Y.

STUDY BOOK AT HOME PREPARE FOR THE BAR

ü

Write today for your copy of our FREE book, "THE LAW-TRAINED MAN," which describes the famous Blackstone home-study course in bar and business law, All needed instruction material furnished including big 16-volume law libray, Bachelor of Laws (LL.11.) degree awarded, Suderate fullton; easy monthly terms. Write today. 225 N. Michigan Ave. Blackstone School of Law Dept. 120-C, Chicago 1, Illinois Founded 1890

RADIO

EVISION ELECTRONICS

TRAIN IN 10 MONTHS OR LESS

Prepare in spare hours for good pay in Television, Radio and Electronics. Train at home taining the standing Radio instructor. Big Ritts of Equipment (maint furnished Build leaters, sets, and the standing Radio hours—ALL FREE! No saleman will call. Witte tolay!

BIG BADIO BOOKS—ALL FREE! No saleman will call. Witte tolay!

Saleman will call. Witte tolay!

Saleman will call. Witte tolay!



PREPARE FOR BETTER

promo-AMERI-higher coupon Private Secretary Refrigeration particulars Clargy, choose the job you want—and prepare for it in you might otherwise waste. Or if you are already work you like best, start training now for quicker; the nam interesset pay. During more than 50 years, can School has helped ambitious people to reach it of some control of the control of the information. ≡ Chicago 37, 2 postpaid, at 58th, FREE and

Drexel

GC46,

AMERICAN SCHOOL,

Without obligation, please send

Drafting—Building Trad Drafting—Machine Trac Electrical Engineering Electricity—Practical 00000000

Baakkeeping Business Management Autamotive ¥

subject checked 00000000

MAIL COUPON NOW I

BIG MEN O

10 to 16

AAA to EEE

We SPECIALIZE in large sizes only—
sizes 10 to 16; widths AAA to EEE.
Loungers: Dress Oxfores; Moccasing:
Cushion Crepe; High and Low
Workshoes; Sux. Enjoy the finest in fit, comfort, style at
maringly low cost. Sold by
mail only. Write for FREE
Skyle Book TOIAAY

KING-SIZE, Inc., 470 Brockton, Mass.

AUGUST 1954 35

anadian HOME

1610 Sherbrooke



WIX Oil Filter Cartridges provide the watchful care over lubricating oil that means car engine health for you ... WIX filters out all the grit and dirt your oil collects in use, giving you constant engine protection and maximum oil mileage.

ENGINEERED FILTRATION

WIX HEVI-DUTY Cartridges far exceed engine manufacturers' specifications and are especially engineered for your individual engine. In taking out more contaminants they still preserve the detergency in today's heavy duty oils. Ask your Serviceman for WIX . . . you'll keep your oil clean, your car engine well lubricated and really healthy. You'll like the careful nursing WIX gives your pocketbook, too.



WIX CORPORATION . GASTONIA, N. C. IN CANADA: WIX ACCESSORIES CORP. LTD., TORONTO TUBE FREE WITH EVERY TIRE AT NO EXTRA COST
LOW OVERHAND—LARGE VOLUME SALES & SMALL PROFITS
BRING YOU THESE "LOWEST PRICES" SUMMER SPECIALS—
WHAT GOOD IS A TIRE WITHOUT A TUBE?

WHY PAYN 21 YEARS AT THIS ADDRES

MORE! HAPPY MILES, BE WISE—TRY O

YOU'LL BUY MORE! WE WELL

COMPETITION, NO ONE CAN TO

Ox 16(6)

STANDARD 834 N. Broad St., Philadelphia 30, Pa.

When YOU talk-Watch

The Expression on People's Faces!

Amazing Training Method Quickly Helps You Develop Confident, Self-Assured Volce su Develop Contident, Selt-Assured Voice receptor are Impressed by the sound of your trained voice gives you a big advantage. A good voice helps you attain pole, presider, responsibility, Almost all effective speakers (responsibility, Almost all effective speakers) (responsibility, Almost all effective speakers) (responsibility, Almost all effective speakers) (responsibility) (responsibili

PREFECT VOICE INSTITUTE

detalls

This Universal makes one of the st, cheapest fires known. Money-Back Guarantee, tents Prices and full de

Agents

Home-Business opportunity! HELP US FILL HUGE DE-MAND from 20 million hobbyists. Some Rare beautiful multicolored species sold for \$75 PR. AND MORE. It's easy! It's fun! WE SUPPLY EVERYTHING YOU NEED. Write for FREE plan, reprint, folder and all the details. Please state your age TROPICAL FISH BREEDERS OF AMERICA. Dept C8. Los Angeles 15, Calif.

BOAT



TAFT MARINE WOODCRAFT 636 39th Ave. N.E. Minneapolis 21, Minn.

🐃 PLASTIC LAMINATING AT HOME! Get ORDERS and CASH from your mail-man—do work in SPARE TIME at home — or expand into FULL TIME business.

or expand into FULL TIME Dustiness. Send coupon for Free facts about the newest and most fascinating of all home operated manachine brings the fabulous profits of Plastic Seeling and Plastic Laminating within the reach of the smalloup pract of April 1997. The property of the property o MAN . .

supply the circulars you mail to bring back cash and orders. Don't waste a minute. Rush your name. We'll send you FREE and postpaid, pictures, prices, details, and all the facts you need to start. Mail coupon or send name on postcard. No charge. Warner Electric Co., 1512 Jarvis Av., Dept. L-9-J, Chicago 26. Illinois

WARNER ELECTRIC CO., 1512 Jarvis Av.
Dept. 1-9-J, Chicago 26, III.
At no cost to me, please rush complete details
postage prepaid. I am under no obligation.

City State

Make Thousands of Beautiful Art Creations COSTUME JEWELRY . CIGARETTE BOXES TRAYS . CANDLESTICKS . COASTERS LAMP BASES . BOOK ENDS...ALL IN /





man...is taking out of the machine a Plastic Sealing Job — ordered by mail — only lie in material cost brings back \$2.58 in cash by mail. Capacity of machine: \$25.00 prefit per hour of operation.

AUTO **COMPASS**

with America's finest auto com-pass, Accurate-dependable-trou-ble-free, Quickly and conveniently mounted on any car, Alweys insket mounted on any car, Alweys insket compass approved by auto manu-facturers, Send for free folder 'Pants' Knives, Compasses' and name of nearest dealer.

NE NNW TRAVELITE only \$549

Gulde-Way \$4.49 Dinsmore Instrument Company Non-Illuminated 1814-35 Kelso St., Flint, Mich.

Build your own JET ENGINE!



Order these plans today

Order these plans today

1, JET PROPELLED BICYCLE. Assemble
your own. Photo and instructions \$1.00,

2, HOW TO MAKE EXPERIMENTAL JET
ENGINES. Seven sheets drawings with information and instructions \$2.55,

END NO MONEY. Order both at once
\$4.75 C.O.D. in USA plus c.o.d. postage.
Send check or Money Order and we pay postage. Get other information too. Reals Order.

J. HOUSTON MAUPIN, Dept. 66, Tipp City, Ohlo

ALL YETRANS DISCHARGES BEFORE AUGUST 20, 1922 must be enrolled and IN TRAINING by August 20, 1854, or to be enrolled to the free education under EW G. I. bill. We train you at home to become a trained IV Technician—wood pay and a bright future in TVI Time is short. Send for 4 FREE AIDS and details! (Non-veterans toot)

TRAINING ASSOCIATION, PADIO-TELEVISION Dept. P-8B 52 E. 19th St., New York 3, N. Y.



booklet

We'll send generous collection of hard-to-get (mint and used) We'll send generous collection of hard-to-get (mint and used) Ceylon, Seychelles, South Africa, Tristan da Cunha — many others. PLUSI FREE copy "Stamp Collectors Guide"!— FREE color copy World's Rarest Sampl Other Offers for your free inspection, Rush name, 10° for postage and handling—limited time offer! GARCELON Stamp Co., Dept. 8PSO Calsis, Maint.

EYE GLASSES by MAIL As low as

WRITE for FREE CATALOG with 14 LENS SAMPLE CARD Thousands of Customers Ew. 1939



QUALITY READING-MAGNIFYING OF BIFOCAL GLASSES FOR FAR AND NEAR ADVANCE SPECTACLE COMPANY. Inc. 537 S. Dearborn St., Dept. SP-8 Chicago 5, Illinois

This FREE Book Led Me To Success In Says: Phil DeCopito, **Engineering Draftsman**



"IT'S EASY IN YOUR SPARE TIME AT HOME! I wanted to get in on the big money and success that Industry is offering engineering draftsmen. I'm sure and sent in the C. E. I. coupon. Becoming a draftsman was a cinch with CEI training and canhing. And, I'l could do It. so can Yo'U! Send for the Success Book today."



Set at NO Extra Cost! | NAME ...

ENGINEERING

SUCCESS BOOK -

| Cleveland Engineering Institute Extension Division PS-8-D 6300 Euclid Ave., Cleveland 3, Ohio ! () Mechanical () Aeronautical

CITY.

STATE No Obligation — — No Salesmen

AUGUST 1954 37



L L.B. DEGREE

LaSalle's famous Law Library—used as reference in many Law libraries and Law officeshas enabled thousands to master Law sur-prisingly fast, in spare hours at home, for business and professional advancement.

These 14 remarkable volumes, compiled by leading professors and lawyers, cover the whole basic field of Law in condensed, orderly, simplified manner.

You advance rapidly with this great library, plus special lectures furnished. We guide you step-by-step with personalized Problem Method of instruction . . . you learn by doing-han-

ddinglegal problems—not by memorizing rules. Send for two FREE 48-page booklets, "Law Training for Leadership," and "Evidence," answering questions about Law and its value to you, and telling how LaSalle Law graduates are winning rapid advancement in business and public life. Mail coupon below. No obligation.

LA SALLE EXTENSION UNIVERSITY A Correspondence Institution

417 S. Dearborn St. Dept. 883L Chicago 5, III. Send me your two FREE booklets described above, without obligation.

City, Zone & State_

Paint STRIPES with

Makes Straight, Curved or Parallel Lines!

Just fill glass via with any color paint, Use the plant of the plant o

New! "DOUBLE-STRIPE" MODEL Only \$2.95

MODEL Only 3.2.95
Newest paint striping invention. Makes DOUBLE stripes—
one wide and one narrow
or two wide or two narrow
at the same time. Or adapt
quickly for wide or narrow
single stripe. Makes 5 combinations. FREE—Send postcard for complete information...or order now... £2.95.

DEALERS Master Paint
Striping Tool packed
In Display Cartons of
I dozen. Fast, profitable
seller. Write for discounts.

Attention All Home Craftsmen! Attention an nume unationer.

New Paint Striping Tool gives
"professional" results every time,
yet simple and easy to me an a fountain
pen. Adjustable guide keeps lines straight
as an arrow. Just as easy to make curves or
an arrow. Just as easy to make curves or
an arrow. He was a foundation of the straight
look to deselve and and the bend \$1 now.

WENDELL MFG. CO., Dept. 2-J 4234 Lincoln Ave., Chicago 18, Illino

6 Other Complete Tools

Complete tools for 1/64, 1/82, 3/64, 5/64 3/32 or 1/8 inch stripes, \$1.50 each. Ex-tra tips 75c ea. COMPLETE KIT with ALL 7 TIPS, \$5.00. (Also 1/4 tip, only \$1.00). All tips interchangeable.

SENSATIONAL NEW LOW COST PORTABLE BLACKLITE

COMPACT . BATTERY OPERATED Never before has a partable blacklite instrument of camparable quality been available at this law price, Mineralogists, gealogists, engineers, miners, prospectors and hobbyists will find this instrument perfect for field trips and lab work. The unit is campletely self-contained and battery operated. Mounts a 4 watt long-wave ultra-vialet bulb recessed in campact, sturdy all-metal case, Features chrams handle and black wrinkle finish. Weighs anly 6 lbs., measures 7" x 3%" x 4%",

When ordering please specify chaice , with ar without batteries, Please enclose full amount with order hipped pastoaid Denlar Inquires Invite

\$12.95

FREE!

& H SALES COMPANY

BUY IT

Start a Buying Service at Home UP TO 40% merican Buyers Service

631-PS LINDEN AVE., BUFFALO 16, N. Y.

ina HIDDEN TREASURES GEIGER COUNTERS (as shown) for Uranium Detection, TREASURE DE-TECTORS for gold, silver, etc, Light-weight, ultra sensitive. None finer. Also Mineralights for Tungsten.

Mineralights for Tungsten.
• INFORMATION FREE •

electron co. 5420 Vineland, North Hollywood, Calif

CUT & POLISH

FOR FUN! FOR PROFITI

New you can guickly learn to cut and polish gen stenes easily all the control of the cut and polish gen stenes easily after to find gens—hew to turn them into precious jewels with lew-cest equipment. Cemplete course (with FREE couper cedemable for full purchase price) only 25.00. Mensy-back

GEMLAP 1265 W. 76th St., Cleveland 2, Ohio

Catalog or 3000 Novelties 10c

for amazing catalog of neverties, the animate of supplies, hobbies dimmaters, plane & boats, maple tricks, johe articles, unusual seeds, and se JOHNSON SMITH & CO., Dept. 831

I'll Send You This Handsome SAMPLE CASE-FRE



nd Show You How to Make Up to \$30.00 in a Day

Take your Short Cut to HIGH-PAY JOBS or BE YOUR OWN BOSS IN



TRAIN FOR SUCCESS AS A TV TECHNICIAN IN

Are you looking for employment opportunities with a FUTURE? What are your chances for promotions or raises in your present 1909 BETTER YOURSELF. .. train NOW for profitable jobs in the booming Television Industry. Thousands of top jobs are awaiting the Trained TV Technician. HERE IS YOUR BIG OPPORTUNITY IF YOU ACT NOW!

MANY UTL TRAINEES MAKE \$25 A WEEK IN SPARE TIME, while still in training. The money and radios for neighbors, assisting service shops and distributors, more than paid for the training, and permitted them to enjoy many of the luxuries in life.

NO EXPERIENCE NECESSARY YOU ARE READY TO TRAIN AS YOU ARE!

You don't have to know the first thing about electricity or television at the start, to master UTL Training, Step-by-step instructions TELL you how— thousands of pictures, diagrams and charts SHOW you minow! The finest equipment GIVES you the Knowhow! Age or experience is not important...just your AMBITION.

Be Your Own Boss No Money Down!

Start your own profitable service business immediately after ice business immediately after graduation, without putting one cent down for equipment, stock, parts, and tubes. Get the amazing details! ACT NOW... OFFER LIMITED TO FIRST COME, FIRST SERVED.

NOTE TO MEN PAST 40:

If you find it difficult to get ahead, here is your opportunity to be independent and have your own thriving business.

UTL has Successfully Trained Thousands

UTL sends you everything you need for successful Home Training. These BIG KITS, which you keep, convert any table into a fascinating experimental laboratory. Enjoy doing hundreds of thrilling experiments and inof thrilling experiments and in-teresting demonstrations. Build professional equipment to use in your career, including a voit-ohm-militameter, a com-plete superheterodyne receiver, a cathode-ray oscilioscope and other valuable units. Practice servicing on TV receiver units!

Amazing Training Program has caused grad-uates to say UTL training was responsible for their getting ahead so fast . . trainers report UTL training is the easiest thing they have ever done! Training is professional and effi-cient ... you are treated as a person, on an individual basis.

TRAIN AT HOME set your own pace, with parts and equipment sent you. UTL instructors give you full assistance. Your training is remarkably EASY. Upon completion, you...

TRAIN IN UTL LAB. for 160 hours of VANCED TV EXPERIENCE! You operate modern equipment found only in a lab; do interesting trouble shooting registers and the contract of the c interesting interesting trouble-shooting assignments: get the professional touch by knowing accepted TV circuits, equipment and standards!

JOB PLACEMENT SERVICE and BUSINESS PLAN IS AVAILABLE when you complete your training. Excellent record. Find out for yourself!

COLOR TV TRAINING INCLUDED!

Excitins, profitable COLOR TILLS now a commercial RETLIS now a comme

This means ADDED OPPORTUNITIES FOR YOU with UT TRAINING. ACT NOW get in on the ground floor of COLOR TVI



FREE! Exciting big 48-page

Here are your

Opportunities in Television

book is jam packed with information on how to get high pay jobs in TV; how easy it is to train; how to easy it is to train how to build up pres tige and income at the same time; how to take advantage of



UNITED TELEVISION LABORATORIES 19th & MAIN . LOUISVILLE, KENTUCKY

UNITED TELEVISION LABORATORIES, Inc., Dept. SS4A 19th and Main Streets, Louisville 3, Kentucky Send me the big, valuable 48-page book of Oppor-tunities, FREE! I understand I am under no tunities, F

Name Address City_ _Zone__State_

Married_ Single_ PLEASE SEND DETAILED INFORMATION ON:

TV Technical Training
Owning my own business
Television Studio Techniques
How to get a high-pay job in TV



s show you how extremely casy and PROFITABLE it is to make Itul and useful things out of LIQUID PLASTIC, LIQUID MARS LIQUID IVORY, LIQUID GLASS, CERAMICS, ETC. Bas pouring water out or a glass! Make novelles, levelry, gifts.

PLASTICAST COMPANY, (Dept. A)
Box 6737 (Write to P.O. I



PLASTIC LAMINATING

strated) \$35.00 plus postage. Oth higher, Free literature! ASTICAST CO. Addresses shove



BE POPULAR . AMAZE . ENTERTAIN

Learn to apply Hypnotism and Autosuggestion in short time, by train-ing at home, with GUARANTEED RESULTS - DON'T DELAY. Write to America's oldest, most famous Hypnotic school for COUPON free information - now - to-AND dav. MAIL

	_		
SCHOOL	OF	APPLIED	HYPNOLOGY
Dept. 28			

120 Central Park South, N. Y. 19, N. Y. Please send me Free information:

SENT IN PLAIN WRAPPER

JUST

FILL

IN

DDRESS	

.....STATE.



Tube Given Free with Each Used Passenger Tire Upon Request

YOU CAN'T LOSE!!

 Super Quality — Rugged Performance — 15 Months Insured Service
 600x16
 \$3.65
 670x15
 \$3.95
 700x16
 \$4.45
 760x16
 \$4.75

 650x15
 3.85
 670x16
 4.05
 710x15
 4.35
 820x15
 4.9

 650x16
 4.25
 700x
 3.95
 760x15
 4.45
 350x17
 4.6
 Supreme Quality — Nothing Finar — 20 Months Insured Service Control of The Contro

MIDLAND TIRE SALES

SET \$9.80

Plates Only 10c Pound

COMPLETE

Speedy shipments on Mail Orders, F.O.B. Chi insurance Policy sent with each order. Deduct on orders for 2 or more used tires, Send CHEC 3701 S. Normal, Dept. SS-22, Chicago 9, III.

100 POUND

This is our feature set and is the manufactured.
Training with a control of the set of t

BUR BARBELL CO. Lyndhurst 5, New Jersey

"SNOOPER Super-sensitive! Only 114 lbs.I Fits packet-Super-sensitive! Only 1% lbs.) Pits pocket— uses flashlight battery. Find a farture in uranium. Order Naw! Send \$5,00, balance C.O.D. MONEY BACK GUARANIEE, FREE CATALOG—scintilloter and larger uranium and metal detectors, DEALERS WANTED.

PRECISION RADIATION INSTRUMENTS 2235 PS S LA BREA, LOS ANGELES 16, CALIF.

CHANCE TO ADDRESS & MAIL POSTCARDS AT HOME write BOX 9, WATERTOWN, MASS

V	YH	BB	LS	WI	IEE	LS	WH	EELS
								45c ea.
8	DISC	C Wheel	11/0"	Tire 1/	" ball I	bearing		80c ea. . \$1.00 ea. . \$1.35 ea.
10	Disc	Wheel	1.75	mi-pne	um. T.	1/2" B.	B	. \$1.50 ea.
12	Disc	Wheel	1.75	semi-p	neum.	ire sa	B.B	. \$3.50 ea.
Ab	LES-	Sizes 5/	16 In.,	36 In.,	1/2 in0	out to sl	ze-End h	's accepted.
12	131 1	S. PEOI	ITED	REET	EL ST/	MPIN	G CO.	ILLINOIS

STAMPS ONL



E.1. Valuatie foreign stamps showing floorests, Washington, Lincoln & Missington, Arthur on Indonesian and Moluccas is after a stamps show Americans. Also is a stamp show the show show t

imported Exotic packet and special imported collection, 327 different stamps in all Just 25c to introduce our approval service to you. FREE (with order): Magnity glass, hinges and perforation gauge! NATIONAL STAMP SALES, 832 8th Av., Dept. AT, New York 19, M.Y.



Here are hundreds of opportunities offered especially to the readers of Popular Science Monthly. Read them. Answer them! You can make

lead them. Answer them! You can make

POPULAR SCIENCE MONTHLY - 353 FOURTH AVE. - NEW YORK CITY

Classified Ads only 90c per word per insertion, payable in advance. Minimum ad 10 words. To be included in October issue, copy should be in our office by August 25. No cancellations accepted after August 15th. Address orders to O. K. Kelly, Classified Adv. Mgr.

AUTOMOBILES & MIDGET CARS

HI-Mileage-Speed Equipment from the World's Largest Supplier. Dual manifolds, finned heads, electric doors, lowering sets, finned heads, electric doors, lowering sets, the sets of the set of the set of the Huge estalog. 250 (Hustraged Literature free). Wholesale to garages. Newhouse Automotive Industries, Los Angeles 22.

MODEL T Fords Saie. Details and photos \$1.00. Box 381, Williamsport, Pa.

FREE motor magazines; automobile ilt-

FREE motor magazines; automobile literature, old, new and foreign; glossy photos, dealer books, shop manuals—of-fered with non-profit organization. Write today; get on free mailing list. Auto Maniacs. Inc., Stockbridge. Michigan.

FIBERGLAS automobile bodies. Build your own. Lowest prices. 14 years plastic experience reflected in complete information catalog—10c. Gem-O'-Lite, Box 8852A. North Hollywood. California.

AUTO owners Law Book \$1.00. Richmond Enterprises, Box 1003, Augusta, Georgia.

CROSLEY parts, speed equipment, accessories, plastic bodies, tire recaps—big discount to club members. What model Crosley do you drive? Write: Crosley Club, 2101 Greenway, Charlotte 4, N. C. REBUILT. Engines for midget care

REBUILT Engines for midget cars \$17.00 to \$37.00. Send \$1.00 for catalogues. Cauffiel Motor Industries, Temperance, Michigan.

AUTO SUPPLIES & EQUIPMENT

BRUSH Plating Outfits connect to a battery. No tanks or shop required, Free particulars. Gunmetai Co., Ave. K. Decatur. Illinois.

1954 EDITION. It's New! It's Different Get world's largest Auto Accessory & Parts 50,000 lems, including Hollywood Accessories III-Speed Equipment. Rebuilt Engines, ail parts and accessories for ail cars and trucks. We have that Hard-To-Get pricely illustrated. Send 26 entine days pretely illustrated. Send 26 entine days J. C. Whitney, 1919-KB Archer. Chicago 16, Illinois.

"AUTOMOBILE Accessories", for Free Triai! Write—Neher Industries, LaVerne 6. California.

NEW And Used Parts At Sayings. Complete guaranteed parts service for all models cars and trucks, late or old. Largest in the West. Army parts specialists. No catalog—write for quotations. Fast Mail Order Service. Pioneer Auto and Truck Parts Co., 788 W. 13th Avenue. Denver,

SAVE your life with amazing new "Torsion-Flex" Sway-Bilizers! Stops sway. skid, slide. Postal brings free illustrated literature. gift offer. Sway-Bilizer, 5434-B Higgins. Chicago 30.

AMAZING wattage-power regulators. Stop generator, regulator and battery trouble. There is no better regulator for cars and trucks. Guaranteed. New, try it on own car plan. Write Scientific Electric Co., Box 2162-BC. Cleveland 8, Ohlo.

SPEED equipment, any car, write Power, 27 West 117th, Hawthorne, Caiifornia.

FORD-T Parts—Engine and chassis. Parts for other oid models. Special parts made to order. B. S. Wisniewski, Milwaukee 7. Wisconsin.

CUSTOM Accessories Headquarters. New summer catalog . just out most complete ever . , jam-packed with Items not in stores. New Low Prices.—25c. Eastern Auto. 3319-D South Grand, Los Angeles 7, Calif.

"OVER 200 miles per gallon Gas—Your car", claims inventor, free information, Gane Economy Club, 8664 West Pico, Dept. PS-8, Los Angeles 35, Calif.

\$3.00 NOW will give you a better motor. Use the patented Lachapelle's Treatment. Ferns Products. 8120-D Wainut Dr., Los Angeles 1. Caiff. Free data.

PUNCTURE-proof your tires in 5 minutes. Write: Spaadco. 412-D Portiand, Rochester 5, New York.

AIR Condition Your Car. Send \$3.95. Veale, Box 5. Columbus, Indiana.

Veate, Box 5. Columbus, Indiana.
SENSATIONAL Free Trial Offers! Surplus stock of famous Gale Hall studently plus stock of famous Gale Hall studently plus stock of famous Gale Hall studently for the property of the property

BUY Wholesale direct. Nationally advertised Auto Supplies, 10,000 other items. Free "Wholesale Idea". National Buyers Service. Box 426FD. Oakland. California.

31½ MILLION Cadiliacs. Bulcks. Olds. Pontiacs. 1936 to 1950 use Spark-O-Liner to get new car smoothness, power gas mileage. Only \$1.50 at all ignition jobbers. Pree factory ignition bulletin shows how to the control of the control

PROVEN Vapor Injection for greater pick-up and mileage, Manufacturer direct, Just \$3.95 postpaid, Golz Enterprises, New Hampton, Hew York.

200 MILES per gation carburetor. Proven practical. Patented. Patent drawing \$2.00. John Andre, Rocky Mountain House. Alberta.

BUY Wholesale nationally advertised auto supplies, thousands other products at big discount. Free "Wholesale Plan." American Buyers', 629-E, Linden, Buffaio 18, N. Y.

RAELITE Pistons any make or model. Compiete Piston Service. Upland. Calif.

END oil changing! Refine your oil as you drive! Refinol antiquates all other oil tractor motor. International Refinol Company. 8847 W. 47th. Brookfield, Illinois. "Chicago's Technical Suburb".

pany. 3847 W. 47th. Brookneid, Illinois. "Chicago's Technical Suburb".

SAFETY Beits. Green, Blue, Maroon, Green Hardware. Instructions Included. 4.95. Box 1142, Poughkeepsie, New York.

NEW Auto-Guard stops thief. Better than insurance. Watches car day and night, Guaranteed. New. try it on own car plan. Write Scientific Electric Co.. Box 2162-BA. Cieveland 8. Ohio.

ELECTROPLATE autoparts, novelties, mirrors. Easy. inexpensive home processes. Pree booklet. Tyoo Metals, Box 13231-FC. Houston 19, Texas.

CAR Burning oil? Losing compression? Try Clifford's Compression Seai. \$2 postpaid. Clifford's Engineering, 1329 Seventh, Aurora, Illinois.

INCREASE: Gasoline mileage Three to Five more miles per gallon. Guaranteed Gasoline Vaporizer, also Increases Power. Easler starting. \$3.50. Turb-O-Vane. Stockton. Calif.

AIR condition your car for pennies, instructions 50c. Ken. Box 1526, Stockton, California.

\$10.000 YEAR, men wanted. \$400.00 required to start. Hewitt's, Medicine Lodge.

Kansas.

AUTO burglar aiarm . . . Stop thefts.
Easy "Do It Yourseif" plans \$1.00 . .
Inexpensive parts anywhere . . Moore.
19205 Almond Road, Castro Valley, Calif.

"AMAZING" — New "Wax-E-Wash" waxes Car As You Wash, \$1.00 a tube. Wil-Don Co., 898 Folk Avenue, Akron. O. MOTORIST Save Gasoline by Vacumating overrich mixtures. Fits on cars. For free particulars write Vacumatic, Dept. 2085. Wauwatosa. Wisconsin.

AUTO TRAILERS

BUILD your own trailer! Plans for all kinds. Iliustrated catalog 10c. Jim Dandy, 125-8. Wausau. Wilsconsin.

ASSEMBLE Yourself. Trailer Kits, Pickup Coach Kit. Blueprints. Literature 10c. Comstock Trailers, 585-5K. Parsons. Kan.

MOTORCYCLES, BICYCLES AND SUPPLIES

RECONDITIONED motorcycles and motors Chromium accessories. Complete stock Indian parts. Expert rebuilding. Fast service. Indian Motorcycle Sales. Kansas City 27. Mo.

Names Cuty 21. Mo.

SMITH motorwheel \$15. Maytag twin engine \$5. Garden tractor \$10. Check motorcycle \$35. Servicycle \$55. (Mailorder only). Send 25c for Directory number 80. Justice of the control of

Onto.

WHGZER motorsecoter \$30.00; two WHGZER motorsecoter \$20.00; two Second Second motorsecoter \$30.00; two Second motorsecoter \$50.00; send \$20.00; motorsecoter \$6.00. Send \$20.00; (35c first class mail) for catalog #26 (35c first class motorsecond motors

SEND for free folder on "How to Build Your Own Motor Scooter." St. Louis Products. Box 24-BH. Normandy 21, Mo. BUILD a Helicopter Jet Engine Your-seif! "Practical Ram Jet Design"—\$1.00. Decker Engine Works, Plasterco, Virginia.

PULSE net plans for helicopter. 6' diameter. \$4. Wolford. Sullivan. Ohio.

PROPELLERS, plans, kits for air boats, now sielghs. Immediate delivery. Catalog 5c. Banks-Maxwell, Box 3301G. Ft. Yorth, Texas.

BATTERIES, GENERATORS, ETC.

EDISON Nickel odorless storage batteries, 12 to 600 ampere hour. Any voltage Long guarantee. Literature. Hawley Smith Co.. Croton Fails 2. New York.

ELECTRICAL SUPPLIES & EQUIPMENT

LAMPS—25c brings bargain catalog showing all parts for repairing building. Contains instructions for electrifying vases, oil lamps. etc. Gyro Lamps. 5402B Clark, Chicago 40.

MAGNET wire, varnish, insulation. Electric Motor Service. 308 Delaware. Mason City, Iowa.

MOTOR rewinding supplies plans, in-tructions. Modern, Box 4704. Kansas Missouri.

WELDING, SOLDERING

"BUILD-Ur-Own" a.c. welder and a.c. power plant with a good used engline and low cost Hobart generator. Welds anywhere and supplies 5KW stand-by power for any emergency. Write Hobartweld. Box P-843, Troy, Ohio.

A. C. Weiders, four sizes, lowest prices, ree Literature, Holgerson Co., Canton, Free L.

MACHINERY, TOOL SUPPLIES, ETC.

ALLEN One Ton Power Bench Punch Press. \$97.50. Circular. Dept. PSB, Chuton, Missouri. Circular. Allen,

LAWNMOWER. Grinder. New. large, fast heavy duty. Which. Complete shop in one unit. Circular. Precision Tool, 430 Yellowstone, Focatello, Idaho.

SENSATIONAL New Ail Steel Wood Working Lathe, 5" Swing, 12" Centers, \$9.95 prepaid, Circular, Sypher Co., 214 Cherry, 'loledo, Ohio.

\$1.00 PIFE vise, send for information. H.A. Johnson, P.O. Box 62, Fruitvale Sta-tion. Oakland, California.

ATIENTION Jointer-Planer Owners: Patented Magnetic Gauge for accurately setting re-snarpened biaces now available. Write: Magna-Set Company, 632 New Haven Avenue, Woodmont, Connecticut,

REVOLUTIONARY nand tool. Increases pulling power 31 'imes. Free literature. Muiti Use Fuller, Box 971-P. Uptown, Ho-boken, New Jersey.

INDUSTRY wanted Buildings labor, housing; other inducements. Perry Breir-hill. Pa.

10 ENGINES, MOTORS, ETC.

WINDING Data, listing 225 motors, single and three phase, \$1.00. Motor Data, Box 7631, Kansas City 28, Mo.

A.C. Generators 750 wait \$38.50. Twin cylinder compressors with \$\frac{1}{2}\$ horse \$22.50. Motors 1 horse \$37.50. Butler, 1885 Milwaukee. Chicago 47.

REBUILT 112 to 3 H.P. Engines \$17.00 to \$37.00. Cauffiel Motor Industries. Temperance Michigan.

11 BOATS, OUTBOARD MOTORS NEW. used rebuilt marine motors. Ma-rine conversions, fittings. Free Catalog. Stokes Marine Supply, Dept. 23, Cold-water. Mich.

water, Mich.
FULL size, cut-to-shape Boat Petterns,
Blueprints, 712-38 feet. New 1954 flusstartlitet-designed Cruisers, Runabouts,
Sloops, Skiffs, Outboard Boats, Sailling,
Racing, Houseboats, 50c, Marine Hardware,
Catalog, 81-36, Bigger, better 1954 'How
Houseboat 1971 and 1972 for the Property of the Property of

OUTBOARD Motor Parts—New—Used for all makes. Send stamp for price quotation, listing parts needed, Outboard Motor Mart, Inc., 229D State Street, Boston, Massachuserts

BUILD marine engines with Federal Conversion Kits. Federal Marine Motors, 9011 Cottage Grove Ave., Chicago 19, Ill.

MARINE conversions for Ford and Jeep engines. Catalog 10c. Lehman Manufac-turing Co.. 972A Broad St., Newark 2. N.J.

BUY Wholesale nationally advertised cutboards, thousands other products at big discount, Free "Wholesale Plan." American Buyers' 628-E. Linden, Buffalo 16, N. Y.

FREE Catalog! Boat Kits, Trailers, Fiberglas, Marine Hardware, Luger Industries, Dept. MD, 3207 Fremont South, Minneapolis, Minnesota.

FIBERGLAS permanent boat coating. Lowest prices. 14 years plastic experience reflected in complete information catalog—10c. Gem-O'-Lite. Box 6862B. North Hollywood. California.

FIBERGIAS—lifettime boat coverings— building materials—compare our prices. Free information. 125 page, illustrated. Auto. Boat, Furniture construction man-ual—80c postpaid. Northwest Fibr-Glass Company. 1531 North Morgan, Minneapo-lis 11, Minnesota.

AIR boat plans kits supplies Catalog 25c, Banks-Maxwell, Box 3301J. Ft. Worth.

BODY-BEILDING COURSES, JIU JITSU & ATHLETIC AU JITSU & EQUIPMENT

PERFORM Thrilling Strong Man Stunts. illy illustrated new handbook 60c. Aiad-n Book Co., 210-ST Fifth Ave. New un Boo York 10. DON'T Want To Wear Glasses? Exercise

your eyes to regain excellent sight with-out glasses. Send \$1.50 to Parks. 249 E. 2 Street, New York City.

BARBELLS. Dumbbells. Exercise equip-ment Courses. Free booklet. Good Bar-bell Co.. Reading. Penna.

FIELD GLASSES, TELESCOPES

FREE Catalogue! Thousands war sur-FREE Catalogue! Thousands war sur-plus optical bargains. Lenses. Prisms, Telescopes. Binoculars, etc. Send \$1.00 for IO Lens Hobbyist Set and Project booklet. G, Jaegers. 691 West Merrick Road. Lyn-brook. New York.

SAVE 25%! Get interesting facts. Free 52 page Binocular. Telescope Catalog. 83.95 to \$250.09! United. 9043 S. Western, A-9016. Chicago 20. Dealers Wanted.

A-soils. Chicago 20. Desirers wanted.
REFLECTOR Telescope Kits from \$6.25.
All parts designed and built at our Hobousing Mounts, Tripods.
Tulbing Ceulars.
Fully guaranteed, Free Illustrated catalog.
Fully guaranteed, Free Illustrated catalog.
available. Send orders and Inquiries to
Esco Products. Dept. PS-3. 1428 Willow
Avenue. Hoboken. New Jersey.

WAR Surplus Bargains! Millions of lenses, instruments, telescopes, blioculars, components! World's greatest optical market place! Send only \$1.00 for beginners. Bol-Lens KH, & big Instruction Booklet, Should be a supported by the beginning of the beginning of the beginning of the beginning of the beginning to the beginning the beginning the beginning to the beginning to the beginning the beginning to the beginning the beginning to the beginning t

TELESCOPES. Microscopes. Binoculars for quarter century. Big bargain scientific catalog 10c. Harry Ross, 70 West Broad-way, New York 7, N. Y.

DYNASCOPE—New Sensational Reflec-or Telescope 65X-130X-167X. 4 power tor Telescope 65X-130X-167X. 4 power Finder fully achromatic, 5 foot Tripod, complete ready for use. Send for Details. Criterion Mfg., Hartford, Conn., Dept. DS3.

REFLECTING Telescopes, completely assembled, 60X, \$29.75, Guaranteed Ob-servatory clearness. Free information Skyscope, 475 Flith Avenue, New York 17. BINOCULARS—Telescopes Microscopes. Terrific values \$3.98 up. Request Free-Money saving catalog. Criterion, Hart-ford. Conn., Dept. S24.

LOWEST prices all sizes Binoculars, Telescopes, Microscopes 8x30 \$32.00. free catalogue. Joe's Binocular Sales, 4827 Second Street. Detroit 1. Michigan.

SPECIALISTS. Used new microscopes. Prepared slides. Supplies. Free catalog. Nassau Optical, 9 W. Greenwich, Roose-velt. New York.

IMPORTER'S Special 7x35 I.F. Binocular \$26.40. 6x30 I.F. Binocular \$19.80 with case each. 10-200-300 power microscope \$9.95 postpaid—tax included, guaranteed, Jo-Jo's, 1825 Atlantic Avenue, Long Beach.

AM&ZING prices binoculars, microscopes, telescopes, Free trial. Folder, "Binocular Selecting," catalog free, Dealers wanted, Prentiss Importers, Mercury Bidg., West Los Angeles 25, California.

GIANT 100X steel and brass constructed telescope completely assembled with two eyepieces. helioscope instructions and eyepieces. helioscope instructions and heavy tripod-\$7.50. Other telescopes at \$12.00 and \$16.00. Free information, 400X telescope makers kit contains brass focusing tube, erector, 5 lenses, instructions—\$3.75. Suffolk Science, Mattituck 4, N. Y.

SPORTING GOODS, GUNS. FISHING TACKLE, ARCHERY, TRAPPING

180 PROFUSELY iliustrated pages, antique pistols, swords. daggers, armor, etc. 50c. Robert Abels. PS860 Lexington Ave., New York 21.

CAST Iron Sinker Molds—for making your own sinkers. Free illustrated booklet. Reading Instrument Co., Box 78, Reading. Pennsylvania

5.000 BARGAINS. firearms, binoculars, war relies. cafalog 50c. Smith Museum, Runnemede. N. J.

FREE copy! The Archer's Magazine. Request: 1200 Wainut Street, Philadelphia 7 Penna

SAVE 50% Finest bows, arrows, complete bowhunting outfits, etc. Free catalog and "How to Select Bow" booklet, Write: (Send 25c for "How to Bowhunt" booklet if desired), Malibu Archery Los Angeles 5. California.

MIN-O-Aire keeps minnows allve. MIN-O-Aire keeps minnows allve. Mo-torized unit. Plugs into car cigarette light-er. 6 voit \$9.95. Fits all minnow buckets. R and R Company, Box 5623. Dallas 22, Texas.

MOLDS for Fisherman's Sinkers, Jigs. Squids. Casting and Spinning Lures. Free Catalogue. Sweet's Molds. Tonawanda 3, New York.

BUY Wholesale nationally advertised sporting goods, thousands other products at big discount. Free "Wholesale Plan." American Buyers', 627-E, Linden. Buffalo 16, N. Y.

EVERYTHING for the shooter! Hand-EVERYTHING for the shooter! Hand-guns, Rifles, Scopes. Targets, Ammunition, Loading Tools, Sights, Equipment, etc. Giant Catalog 25c. Refundable first order. Badger Shooters Supply, Owen, Wisconsin.

GOLF picture score cards cut down score permanent tournament record. Send \$1.00. 6 cards. W. Thomas. 212 Victoria. Costa Mesa, California.

DIVING Lung Compressor. Make your own. Write Stewart. 628 Greenwood Ave-nue. Trenton, New Jersey.

JAP rifles altering American shells 5.00. cataiog 5c. TP Shop, West Branch 10 Michigan.

BIG Fish smell "Quick-Catch" Bait from distance! You hook 'em fast! Bait easlly made! Scientific Directions \$1. Star. 405 Madison. Fort Wayne, Indiana.

SWIMMERS! Send \$3.95 for Imported French Mask. Skin Divers' Catalog 25c. Aquafun, Davenport 5, Iowa. FISHERMEN: Big Fish are Smart Fish

FISHERMEN: Big Fish are Smart Fish that's why they live long enough to be-come Big Fish. Out smart them. use a Hydro-Fin. The slient boat propeller. Write for free information. Hydro-Fin In-dustries. 17521 Mack. Detroit 24. Mich.

CALL Elk. Deer. Coyote, Fox. etc. Original Animal Calls, Burley, Idaho.

CAMPING EQUIPMENT

AIR mattresses, sleeping bags, tents (direct from manufacturer), camping equipment. Low prices, Send 10c for 72 page illustrated tent-camping equipment—tent maintenance catalogue. Mor-San Sales, 10-21C 50th Avenue. Long Island City 1. New York.

17 DOGS, BIRDS, HAMSTERS, RABBITS & PETS

MAKE Big Money! Ralse Chinchilla Rabbits. Cash Markets Supplied. Write Today! Rockhiii Ranch, Seliersville 16, Pa.

RAISE moneymaking Angora, New Zea-iand Rabbits, Particulars free, White's Rabbitry, Jackson, Michigan,

HAMSTERS—goiden; young, \$4.00 pair; illy developed. \$5.00 pair. Adirondack amstery, Prospect 33. New York. fully aeve. Hamstery,

GUINEA Pigs. Cash markets. Bookiet ee. Taylors. B426B. Hapeville. Georgia. CHINCHILLAS (no rabbit) easily raised. Profitable. Big future. Terms. Cliff's Chinchillas, Ithaca, Michigan.

BAMBOO bird cages—Single roof \$3.95. Double roof \$5.95. Hexagonal style \$6.95 postpaid. Jo-Jo's, 1825 Atlantic Avenue. Long Beach. Calif.

PETVET dog and cat first-aid, \$1.00 d. Wey Brothers, Quanah, Texas. ALBINO & Panda hamsters. Literature c. Bili Reid, Simmons Hotel, Wauchula,

Florida. FORTUNES in Chinchilias. Free plan-ontinental, 2834 West 65th Street, Chi-Continental, 283-cago 29. Illinois.

GROW Mushrooms. Cellar. shed. and outdoors. Spare full time. year round. We pay \$3.50 ib. We paid Babbit \$4.165.00 in few weeks. Free Book. Washington Mush-room Ind. Dept. 177, 2954 Admirai Way. Seattle. Washington.

FROG RAISING

JUMBO Frog Raising Profitable Information. Free. Vol Brashears, Berryville,

FARMS, OTHER REAL ESTATE

PARM-Ranch Opportunities. Pavorable conditions. Washington, Minnesots, Mon-tana, Idaho, Oregon, North Dakota, Lit-erature, Iarm descriptions. Specify which state. J. W. Haw. 120 Northern Pacific Ry., St. Paul I, Minn.

CALIFORNIA Ranch Lands. 50c to \$5 acre minimum bid. Farm-ranch-hunt-fish-retire. 10c brings lilustrated land cataigo. outline mays. Tax Land Sales, Box 2350BX. Hollywood 28. Calif.

STROUT Reaity Cataiog Mailed Free! Farms, Homes, Businesses, 34 States, Coast-to-Coast, 3240 bargains described. World's Largest; 54 years Service, Strout Reaity 255-ZB4th Ave., New York 10, N. Y.

MAKE Big Money in Marvelous Houston. America's Fastest Growing City. Buy Guaranteed Homesites in beautiful Suburb. Special price \$345. Terms. Fine invest-ment. Booklet free. Nathan Wood, Box 413. Houston, Texas.

\$5.00 PER Acre. Missouri Land. War-anty Deed. Free List. John Calvert, Plant ranty Deed. F City, Fiorida.

NEW, 12 Unit, modern motel, well locat-ed, cheap. Barnsiey, Clarksville, Arkansas.

POULTRY & SUPPLIES

RAISE pheasants on \$100 week pian, Little capital and space can make you in-dependent. Free details. Great Central System. Columbus 6, Kansas.

22 PROFITABLE OCCUPATIONS

DETECTIVES Earn Big Money. Excel-ient opportunity. Detective Particulars free. Write Wagoner, P-125 W. 86th, N.Y. 24.

"HOW to Make Money With Home Workshop" describes amazing methods used by hundreds of successful craftsmen. Tells what to make. How to sell workshop output spare time. Write at once for details. Craftsman. 115B8 Worth St., NYC. \$5000 FROM Half Acre growing Ginseng crop bought. Particulars 10c. Associated Growers, Speriing, Manitoba.

FREE! "301 Profitable Small Busi-esses!" Amazing shoestring plans! Work Start

Home! Start Sparetime! Deumant Sur-veys, Kenmore 23-T, New York. ADDRESS Advertising Postcards. Must have good handwriting. Box Nine, Water-town, Mass.

CONVERT spare time space into income, little if any competition, brief teils how, \$1, postpaid, Felland, Dept. B. Box 1950, Great Falls, Montana.

OWN A Collection Agency, pays big. Franklin Credit, Roanoke 7, Virginia. WELDING Pays \$\$\$, Learn easily at best equipped school in country, Non-profit School with low cost training G.I. approved. Write Hobart Trade School, Box P-842, Troy, Ohio.

BUY Wholesale direct. All nationally advertised Appliances. Homewares, Watches. Cameras. Sporting Goods, Glitwares. Savings to 50%. Catalog 25c. Refundable. Wholesalers Mart, Box 6125FG, Houston.

BUY Wholesale thousands nationally advertised products at big discount. Free "Wholesale Plan." American Buyers. 628-8 Linden, Buffalo. New York.

DOLLARS in Every Mail. "Professional Mail Order Technique" Information free. S. Hyde. 327 West 120th Street. Los An-geles 61. Calif.

NOVELTY Manufacturing of Ash trays. Book ends. Figurines pays excellent profits. No expensive moids needed, Plastex, Box 167-B. Falis City. Nebraska.

FREE Book "505 Odd. Successful Businesses." Work home! Expect "Odd"! Pacific—37C, OceansIde. Calif.

START "Silverware Renewal Service." Franchise. Exclusive. NuSilver, 508-PS8-PO. Aurora, Illinois.

PANNING Gold prospecting catalog, isting maps, mineral books, gold pans, panning lesson free. Old Prospector. Box 729D2. Lodi. California.

DRIFTWOOD Bookiet—details on finding, processing, lamps, piaques, merchandising, 50c. Driftwood, Box 2361, Kenmore 23, New York.

IMPORTED Oriental Tropical and Euro-pean Gifts. Curios Wholesale! Extremely strange beautiful items that set on sight! Free folders! Temple. 1800 Greenwood. Trenton, New Jersey.

"EVERYBODY Likes Candy." Learn to make professionally. (Our 43rd year.) Ragsdale Candies, East Orange, N. J.

GROW Mushrooms. Cellar, shed. and outdoors. Spare full time, year round. We pay \$3.50 lb. We paid Babbitt \$4.165 in few weeks. Free Bock. Washington Mush-room Ind., Dept., 101, 2954 Admirai Way. Seattle, Washington.

BOOKS & MAGAZINES

SPARETIME Profits Taking Subscrip-tions. Ali Magazines. Wholesale Catalog Free. Cassell Agency. Westfield 1. N. J.

GOOD Used Books, 50c-\$1.00. Free lists, Editions, Dept. PS, Hempstead, New York BE Rich, Make more money, Amazing success book 30c. Used books 12—\$1—List free. Persii, 436 N. Y. Ave., Brooklyn 25. New York.

BOOKHUNTERS! All Subjects. Send Wants! Jaher Book Service, 620-K East 178 Street. New York 57. NATIONAL Geographic Magazines 1888-1952. Any issue. Periodical Service, Box 465-PS. Wilmington, Delaware. Service, Box

ATHEIST books, Catalogue free. Truth Seeker Co.. 38 Park Row. New York 8. SIGHT Without Glasses—153 pages showing how you may regain your natural vision and discard your glasses forever. Also children. Unbellevable! \$2.00. C.O.D.'s

accepted. Lilco, Pine Bluff. Arkansas. BOOK Catalogue. 1000 Bargains, send 10c. Books Publishers, Amityville 2, N. Y. PROPHETIC Books that have converted infidel clubs. Edom Williams, Route 2, Jeffersontown, Kentucky.

NAME The Book-We'll Get It! Chicago lookmart-Ps. Chicago 40.

HYPNOTISM

STUDY Hypnotism Amazing illustrated lesson. Big 230-page treatise jam-packed derstandable language you'll enjoy. Full price only \$2.95 postpaid—or C.O.D. Plus price only \$2.95 postpaid—or C.O.D. Plus Leed. Order "Hypnotism" today. Nelson Company. 210 South Clinton. Dept. 2HW-1. Chicago 6.

FREE Iliustrated Hypnotism. Seifhyp-nosis. Catalogue. Wr'te: Hypnotist. 1324 Wilshlre. Hollywood 17P. California.

LEARN Hypnotism in one week. You can ... anyone can (Details free). Specco. Box 345. Wilkes-Barre 1, Penna.

AUTOHYPNOSIS folto. "25 Hypnotism AUTOHYPNOSIS follo. "25 Hypnotismessons", 25c. Lloyd Collins, Appaiachia

MECHANICAL Hypnotist, new invention causes trances immediately. Instructions, secrets included, \$2.00 Clik, G.P.O. Box 1312, New York 1.

MAGIC TRICKS, PUZZLES, ETC.

500 TRICKS. Douglas famous 120-page Catalog, only 10c. Fastest service to ma-gicians for 30 years. Send 10c today. Doug-las Magiciand, Dept. 2. Dalias, Texas.

FREE Magic & Novelty Catalog, in-cludes 14 wonderful magic tricks fully il-lustrated and described. Read all about our Free Gift Offer. Chicago Magic Center, PS-8, 19 W. Randolph Street, Chicago 1. Illinois.

VENTRILOQUISM Easy to learn in 60 to 90 days! Home Study Course! Resuits Guaranteed. For free information write stating your age. Dummy catalog 25c. Fred Maher School of Ventriloquism. Box 36. Studio PS-8. Kensington Station, De-36, Studio PS-8, K troit 24, Michigan,

VENTRILOQUIAL Dummies. Courses. Scripts. Monologues, etc. Catalogue and illustrations \$1. (Deductible first order.) Gough, 218 N. Jefferson, Hartford City,

PUZZLE fans. Send \$1.50 for your Sur-prise Puzzie. W. Filiippone. 19 Hamilton Avenue. Babylon. New York.

FREE Catalog. Best Magle. Practical Jokes. Top Hat Magic. Evanston 22. Iii. BE a Magician. Large professional magic catalog of latest tricks 35c. Ireland. F-109 North Dearborn, Chicago.

AMAZING—Novei Trick, butterfly flut-ters around lapei flower—then vanishes, appears, sensational. \$1.00 complete. Mingus Magic Shop, 546 Penn Ave., West Reading, Penna.

2500 TRICK Catalogue (512-pages), pocket, parlor, stage. World's Finest Magic. Catalogue \$2.00 (dollar trick in-cluded free). Kanter's, S-1311 Walnut, Philadelphia 7.

HAVE Fun-Learn Fortune Teiling. Send \$1.00. 20206 Hart, Canoga Park, Cai.

COINS & CURRENCY

GET Profit and Pleasure in collecting old coins, Send 10c for 56-page illustrated coin catalox. You'il be delighted with it. Send for it now B. Max Mehi. 374 Mehl Bullding. Fort Worth, Texas. Largest rare coin establishment in U. S. Established 54 years.

FREE! Foreign coin banknote and Coin Collectors' Hiustrated Catalog to approval service applicants. Send 3c postage. Tat-ham Coin Co., Springfield-50, Mass.

UNITED States Rare Coin Value Guide. 48 pages 50c. Fortunes in rare coins. Ideal. 4644-S Geary, San Francisco 18, Caiif.

OLD Money Wanted. Do you know that Coin Coilectors pay up to \$100.00 for cer-tain U. S. Centa? And high premiums for all rare coins? We buy all kinds. Send 4c for Large Coin Folder. May mean much profit to you. Numismatic Co., Dept. 30, rofit to you. Num

JAPANESE Invasion notes for U.S. 1c to \$1.000.00 set \$1.00. 100pp. C Shultz. Sait Lake 10. Utah.

FOREIGN Coins, twenty different each from a different country, \$1.00 postpaid. Webb, 230 Gough, San Francisco 2, Calif. WORLD'S Greatest Magazine for coin liectors and wooden nickei 10c. Law-nce Brothers, Anamosa, Iowa.

COIN Magazine, 100 pages, Sample 30c. umismatic, 7320 Milwaukee, Chicago 31, Numismatic. Numismatic, 1320 Milwaukee, Chineseo 31, SIX different US Indian Head Cents for 25c, Eight different Liberty Head Nickels for \$1,00, five different Canadian Large Cents for 50c, Price lists of US and foreign coins free. No approvals sent, Bryson Stamp Company, 612 White, Toledo, Ohio.

STAMP COLLECTING

200 DIFFERENT, including Roosevelt triangle, 10c to approval applicants, S. Avalon Stamp Co., Springfield, Mass. FREE—Complete set of Famous Americans. Flags. Parks and Presidentials to approval buyers. Send 5c for 15 of the above stamps plus full particulars. Triboro Stamp Company, 145 Nassau Street. Dept. 208. New York 38, N. Y.

POLAR Bear Triangle; Giant George Washington, Six Colored Ecuador, Arctic Triangle, first American commemorative, Corsica, Deviis Island, others, Everything free with approvals. Capital Stamps, Little Rock 10, Ark.

AUGUST 1954 43

65 ALL Different U.S Stamps. Includes 50 yr. oids. commemoratives, airmalis and \$5.00 Stamp. Only 10c. Approvals. Willett Co., Box 511-M. Port Chester. New York.

AMAZING Offer: 200 United States stamps—including commemoratives, airmails, high denominations to \$1.00—only 10c to Approval Applicants! Illustrated Bargain Lists free. Mystic Stamp Co., Dept. 53. Camden, New York.

FREE Stamp Collection:—100 different stamps from Europe, Africa, Asia, Scandi-navia, Balkans, etc. 3c to approval appli-cants. Tatham Stamp Co., Springfield 50, Massachusetts.

327 DIFFERENT Stamps 25c! Including early Canada. Newfoundland. British Coloies. Valtean Red Russia. Hiller Coloies. Valtean Red Russia. Hiller French Colonies. Rarities. Unusuals. Every Stamp different. Rare bargain with approvals. Money back guarantee. Niagara Stamp Co. Niagara-on-the-Lake 62.

FREE!—Big United States Catalog. Val-uable guida and check list. Hundreds of illustrations. Approvats. Harrisco, 469-G Transit Bidg., Boston 17, Mass.

225 STAMPS For Only 10c! This mam-223 STAMPS For Only 10c! This mam-moth value includes Airmalis. Pictorials; stamps from strange Countries cataloguing up to 25c each! Also approvals. Mystic Stamp Company. Camden 55. New York.

"WOW! 153 All Different Germany, 10c" Zeppelins. Semi-Postals. Airmalis, High Values. Fig Bargain lists and approvals included. Jamestown Stamp, Jamestown 509. New York.

FREE—Valuable Illustrated Catalog. Over 1190 special offers, attractive Bar-gains! Approvals, Kenmore, Milford9C, N.H. NUDES S ... colorful approvals—10c! Atlas, 2830-P Eisenhower, Racine Wisc.

COLOSSAI, Stamp Zoo 10e. Jungle Beasts. Wildlife Domestic animals—Fif-teen different. including Rhinoceros. Ele-phant. Snake Tiger Zabu, Kangaroo, Koalabear. Emu. Kookabura. Bull. Horse —Extraordinary accompanying approvals, Send 10e For Postage And Handling. Send 10e For Postage And Handling.

229 DIPPERENT Worldwide Stamps 25c, including Hitter Heads, British Colonies, Prench Colonies, rarlites, unusuals, Everything complete 25c to adults requesting approvais. Canada Stamp Co., 1907 Main St., Dept. 119, Niagara Falls, New York,

FREE 119 Foreign Stamps including Af-tica, Australia, Pakistan, China, India, Russia and Scandinavia, Send 10c for postage and handling, With approvals, Niagara Stamp Co., Niagara-on-the-Lake 82, Canada.

50 DIFFERENT U.S. 5c with bargain approvais. iists. Bookman. Manatee 2, Fla.

approvais, lists, Bookman, Manatec 2, Pla.
PIRST U. N. Set, Among world's Pretiest, Only Mr. Approvais. Welles, Box
Liest, Only Mr. Approvais. Welles, Box
ANIMALS, Birds, Triangles, Flowers,
Butterflies, Fish, Ships, Locomotives,
Kings, Dictators, Multicolored, Historical,
Geographical, Musical, Battles, Olants,
With Approvals, Adults please, Canada
Stamp, Co., 1907 Main St., Dept. 319,
Nisagra Falls, New York.

100 D1FF. Latin-America 25c. Excep-tional Bonus Offer. Mammoth Packet List Free. Econopackets. Box 168-PS. Riverside 22 Calif

MINT airmail sets on approval. A. H., 1207 Northland Avenue. Buffalo 15, N. Y. 1207 Northland Avenue. Buffalo 15, N. Y. FABULOUD Collection Roosevelt and Dictator Stamps. Mammoth fascinating collection of Roosevelt and Dictators incollection of Roosevelt and Dictators independent of the Collection of Roosevelt and Dictators in the Collection of Roosevelt and Dictators in the Roosevelt and Stamp Lorentz in the Roosevelt and Roos

town, New York.

90.000 STAMPS Saie: Grabbag 40c. Big
lot better stamps \$1.—Extra special \$2.
Glant assortment \$5. Persil. 436 N. Y.
Ave. Brookiyn 25. New York. WE buy mint U.S. Collections, New-Way Stamp. Lawrence, Mass.

FREE sample stamp newspaper, valuable information on collecting, special lists, Approvals, Littleton Stamp Co., Littleton A2. New Hampshire.

THOUSANDS of Stamps can be added THOUSANDS of Stamps can be added to your collection at 1 and 2e each. Ask to see our big approval books of attractive. low priced approvals. Everything catalogued according to Scott's. Large discounts. Modern Stamp Co., Dept. B-7. Ferrysburg, Michigan.

PREE-Valuable British Empire Collec-tion! 105 all diff. from Aden to Zanzibar! Includes Cayman. Pitearin and many other exotic colonies. High catalog value! Sent for 10c mailing expenses. Approvals. Kenmore. Mitford 9-T. N. H.

FREE. Scott's International Album. Other premiums. Particulars with approv-ais. Raymax. 35-X Maiden Lane. N.Y. 38. MIDGET Triangie — Giant Diamond. hino, Greenland, 28 others, 3c Approvals, idai, 3396 Aita Vista, Cincinnati 11. O. WANT more for your dollar? Try our

low priced, neat, attractive approvals. Books of 500 and 1.000 U.S. or foreign. We also have a premium card which witi earn you free albums. Write today. Roseland Stamp Co., Dept. B-33, Spring Lake, Mich. 125 DIFFERENT U.S.—\$1.00. Approvals. Utechts. 1143A North Keeler, Chicago 51.

COLONIAL Collection Free-Magnicaro-

COLONIAL Collection Free—Magnicaro-cious collection. British. French. American and other Colonies. Flowers. Animals. Commemoratives. Triangles. Pictoriais. High Values ali free "plus" Philatopic Magazine. Send 5c for postage. Empire Stamp Company. Dept. PR. Toronto,

MINT Five Pound British Colony stamp, guaranteed genuine, face vatue \$25. Just 25c to introduce our famous approvals. Viking. 11-P Northern Bivd., Great Neck, New York.

DEALERS Wholesaie catalog. Postage Franksco. 5031 Queensbury. Baltimore. Maryland.

GORGEOUS Orchid Diamond plus Enormous 5-colored Flag. Will Rogers airmail. First American commemorative. Midget. Corsica and 25 others ail 3c to approval buvers. Beimont Stampco. Washington 15. D. C.

CHRISTOPHER Columbus mint bicolors. Be first to get this beautiful set
to be colored to the color of the colored to the colo

PREE! Price list of 250 different Collector's Supplies, Aibums, Approvals, Lit ton Stamp Co., Littleton G2, N. H.

GIANT and midget triangles, set tiny soldier, sailor stamps, Greenland, colorful flowers, Cigar beauty, Latvia airman, New York Fair, etc. 3c. Approvais, Senbrook, Dept. 15, Washington 16, D. C.

SPAIN 100 different 10c to approval applicants. Moreii, 203 Fenimore Street. Brooklyn 25. New York.

WORLDWIDE, 50 all different, absolutely free, just to introduce our incomparable approvais. Kent Stamp Company, GPO Box 87, Brooklyn, New York.

TRIANGLES! Airmails! Commemora-tives! 10c! Approvals. Alligator. Box 61-PSA, Miami-1, Florida.

STALIN, Roosevelt giants. Ifni. 25 others, 3c. Approvais. Bluebonnet, 4509 Athens, Waco. Texas.

FIVE Congo Pictorials cataloging 46c. only 10c with approvais. W. Torgesen, cornelia. Georgia. Cornelia

FREE with approvals—Israel. British, French Colonial, Latin American, U.S. packet. Philo, 1463 Drexel, Miaml Beach,

ROOSEVELT. Greece. Pope Triangle, Greeniand, Israel. 51 others. 5c Approvais, Longhorn, Box 3068-P Lubbock. Texas. SENSATIONAL Illustrated United States. United Nations, Confederate States, catalogue free. Stone, 45-S Bromfield, Boston 8, Mass.

8 Mass.
PHOTOSTAT your stamp collection,
without a camera. Very inexpensive, no
experience necessary. Complete details,
50c. Jim Mundy, Box 381. Smyrna.. Det FRENCH Africa—West Indies—Over 100 others, only 10c! Approvals included. Cole, 43-G Rinewalt. Buffajo 21 New York.

SURPRISE gift. Ask for approvals. Hearn, 22 Mohawk Trail, Greenfield, Mass. DIFFERENT: 1.000—\$1.00; 2.000—\$2.50; 3.000—\$5.00; 5.000—\$10.00. List, approvals on request, St. Amant, Box 128, Gonzales.

Louisiana. TWO \$5.00 US stamps plus 20 different, 10c with US approvals. Irwin Stamp Co., Box 1109, Brooklyn 30, New York,

LEOPARD, antelope, eland, plus world-wid; packet, free to approval buyers. Con-quistador. 2627A Troy Road, Schenectady 9, Nev York.

EXOTIC Oriental Collection; 105 all dif-ferent stamps from Borneo. Hong Kong Malaya. Sarawak. Kores. Japan and many plus free booklet and bargain lists. All for only 10; to new approval customers. Jamestown Stamp Co. Dept. 310, James-town, New York.

GENERAL world wide (old school way have stamps or get them) dealing of stamps. For satisfaction write Sophus Jenssen. Coupeville, Washington.

100 JAPAN 10c. All different, with ap-1. California.

ECONOMICAL ½-1-2c Approvais. 22.000 varieties available. Dresel, Box 270-T, New York 25. New York.

OLD scarce U. S. seconds on approval. Slightly defective, bargain prices. Hearn-feld. Ciintonhiii Station, Newark 8. N. J. 50 DIFFERENT Bulgaria 10c! Approvals, Ensign Stamp Company, Dept. S. Berdan Avanue, Paterson 2, New Jersey.

FREE Sample—Interesting, informative. Iliustrated! National Stamp News, Ander-son. South Carolina.

WONDERFUL Offer Seven complete mint sets only 10c with approvals. Reich (S26), 1033 Lawrence, Chicago 40.

PENNY Approvais by country. M. H. Hoerning, 102, Farmington. Ark. WORLD 1000 different \$1.50, 3000— .00. Wexler, 5702 Farragut, Brooklyn 34.

COLLECTIONS all different stamps only 3c each! 25 Japan. 25 Austria. 25 Denmark. 25 Netherlands. Or all 4 packets only 10c! Approvals. Goliath Co., Bethlehem X2 N. H.

G5ORGE offers George VI Kenya set 1c to one Shilling used cataloguing 50c for 10c. Approval preferences appreciated George Richie, 1539 Sixth, Atameda. Calif. WEIRD, fascinating. Congo Idois, (10) only 25c to applicants for better grade Foreign. Approvals. Faith. 1339½ West-minster. Alhambra. California.

UNITED States—40 different 10c; 40 different Commemoratives 25c. No approvals. Seidenberg, Appleton 944. Wisconsin. 20 PHILIPPINES 10c. Pictorial approv-als. Mcffat's, 921 College. Rock Hill 21, South Carolina.

100 DIFFERENT Spain 25c, Penny ap-90. Illinois.

1000 DIFFERENT 50c, approvals. Oueii-ette. Box 2143S, Fail River, Mass. UNITED Nations cover free to appli-cants of U.S. or British Colonial approv-als. Alan A. Taylor, Skyland, N. C.

FREF U.S. Illustrated bargain catalogue. Rothberg, 53 Bromfield, Boston 8-P. Mass. EARLY U.S.! 226 issued 1857 plus 20 other nineteenth century 25c to approval applicants. AAA Stamp Company, Arcade Building St. Louis 1, Missouri.

START your own stamp business. Send or for wholesale catalog, Shepard, Box 10c for whole

LOOKING for better U.S. Approvals??? ry New-Way Stamp, Lawrence, Mass. 1000 DIFF, \$1.00 with approvals, Jacob-ni, 4395 Broadway, New York 40, N. Y. sen, 4395 Broadway, New York 40, N. Y.
FIJI Bicolored Health Set. 5c. Approvals, Pleasure Stamps, 1865A—52nd, Brooklyn 4, New York.

250 STAMP hinges and 20 different Australia free with approvals. Jaydee, 218 West Dickinson, Grand Rapids 7, Mich. 100 DIFFERENT US Commemoratives for \$1.00 150 Different US Commemoratives for \$2.00 .200 Different US Commemoratives for \$4.00. Price lists of USA and foreign stamps and coins free. No approvals sent with above. Bryson Stamp Co., 612 White. Toledo, Ohlo. SOUVENIR sheet 10c with approvals. (Ten different, \$1,00) Variety Stamp Service, 57-S Circuit Avenue, Newton Highiands 61. Mass.

CIPEX souvenir sheet plus 25 different S., 10c. Approvals accompany. Village U.S., 10c. Approvals accompany. Village Stamps. 90-39B 214 Street, Queens Village 28, New York.

\$20 CATALOG value stamp, huge African pictorial set, gigantic Chinese stamp, free membership in International Collectors Club, 10c with approvals, Frontier, 2902E Turney, Phoenix, Arizona.

LOOK! Ten different foreign sets. 10c. Approvais. Farmer, 4913 Rosewood, Los

INTERESTING Packet Free. Approvals. Farley Stamps, 201 Cedar, Kingsport. Tennessee.

AMAZING introductory offer—113 dif-ferent including mint Peace Dove set, tri-color set. Air Mail set. Sport and Flower triangles, and beautiful Queen Astrid Me-morial. 10c with approvals. Boulder Stamps, Box 578-S. La Mesa, California.

ANTIQUES, RELICS & INDIAN GOODS

4 FINE Indian Arrowheads \$1.00, notched filnt tomahawk \$1.00. List free. Lear's, Glenwood, Arkansas.

ANTIQUE firearms, swords edged weap-ons, illustrated bookiet 25c, Westbrook, 738 Royal Street, New Orleans, Louisiana.

TWELVE beautiful genuine specimens from Gemland Brazil: two dollars, Perfectly cut ten carat Brazil—Topaz: three dollars, Airmail bills or check, no money-order please. Jean Bach. Praia Icarai 413, Niterol. Brazil.

GENUINE California Gold Nuggets em-bedded in jewelry. Write: Shipler of Etna,

GEMSTONES, Mineral specimens, Geiger Counters, uranium samples, Every variety, Lowest prices, Pree booklet, Plummer, 4720 Point Loma Avenue, San Diego 7, Caiif.

GEMCUTTING. Silvercraft authority, Illustrated magazine tells how. Cut rocks, make jeweiry. 150 ads illustrating equip-ment, offering gems for collectors, cutters. Postal brings literature. Lapidary Journal, Drawer D. Palm Desert, Caiff.

LODESTONE—Magnetic Ore \$1.00. Fin-ished Magnetic Paper Weight \$2.00. Olm-stead Company, 116 East Markham, Little Rock, Arkansas.

SAPPHIRE—tourmaiine—topaz—garnet—peridot. 5 uncut gem specimens. \$1.00.
O'Briens. 1116B Wiicox, Hollywood 38, Cal. BEAUTIFUL synthetic ruby, sapphires \$5.00 carat, Daves, 4309 Glenhaven, Dallas, Texas.

HOBBIES, COLLECTIONS

INVENTING can be an interesting and profitable hobby. Write for complete particulars. Institute of American Inventors, Dept. 30-E, 631-E St., N. W., Washington 6, D. C.

UNUSED matchbook covers—100 different \$1.00—36 page catalog 25c—matchcover album \$3.00. Charles Edelman, 1311P East 84. Cleveland 3, Ohio.

POST Card Collectors—16 First Issue Views of Cleveland. Supply limited. 50c prepaid return. Cemco Cards, 8701 Cedar, Cleveland, Ohio.

MILITARY Miniatures: U.S. Marines.
American Revolution, Civil War, Custer's
Cavairy, Illustrated Catalog 25c. Bussler
Miniatures, Dept. E, 59 Russell Park,
Quincy 69. Mass.

PHOTO FINISHING, PHOTOCOPIES, ETC.

TWO Prints each good negative, 8 exposures, 35c; 12 exposures, 50c; reprints, 4c. Mayfair Photo Service, Box 617-A, 4c. Mayfair ... Toledo 1, Ohio.

DISGUSTED with poor photo finishing? Something new. Send film or inquire. Your credit is good. Statement with finishing. Jerry's. Dept. D. Box 1231, Lansing.

PHOTOGRAPHY For Pleasure or profit. Learn at home. Practical basic training. Long established school. Free booklet. American School of Photography, 835 Di-versey Parkway. Dept. 174C, Chicago Ii-

8 JUMBO Prints in Album 30c. 12 exp. 5c. 20 exp. 85c.; 36 exp. \$1.25; Free Mailer. Mei's Photo, Box 106D, Brooklyn 20, New York.

20. New York.

ROLLS reprints jumbos in albums 8—
30c. 12—40c. 16—50c. Bobs Photo, Box 23.
Fairmont. West Virginia.

SENSATIONAL! 8 Jumbos—25c. 12—35c.
SSMSATIONAL! 8 Jumbos—25c. 12—35c.
SSMSM—36 exposure—31.00. Guaranteed Quality. With this ad only. Flash-Foto, Box 36A. Brocklyn 4, New York.

PHOTO Print Bargain Only \$1.00 for oversize prints of any 8 or 12-exposure film Plus new, freshly-dated Kodak film. 24-hour service. Don't take chances on prints. Let Whitehall skilled finishers with prints. Let Whitenall skilled inlishers with years of experience most modern equip-ment, highest quality materials, photo-finish your films for very best results. Satisfaction guaranteed or money back. Free Catalog of Photo Novelties and Port-folio of Christmas Photo Greetings. Whitehali Studios. Inc., Dept. 19, Elmira, N.Y.

NOW-8 Exposure roils, Jumbo Size 35c; 12 exposure roils, 50c. Refund on Jumbos 12 exposure roils, 50c. Refund on Jumbos 6 each 30c; 2 each 40c, 4dd to for 12 sind 16 exposures, 20 billioids on double-weight paper, from print or negative, 81,00. Please specify offer wanted. L.A. Eastman Studio, Bode. Iowa.

KING-Size Frints from your roll flim KING-Size Frints from your roll flim developing included Finest-quality, fast service from photo capital of the work Over 200,000 astisfied customers, 8 expen-sion of the control of the control of the \$1.40). Moncy-back guarantee. Send for free mailing bag and complete price list. Rochester Laborator, Rochester 1, N. Y.

BEAUTIFUT, Results at Low order, and the state of the sta

4x6 OR 3½x4½ oversize glossy velox prints 8 exposures 40c, 12 exposure 60c, 16 exposure 80c. Hagner Photo Service, 1318 West Columbia Avenue, Philadelphia

22. Pa.

SENSATIONALLY New—16 oversize contact prints or 8 piastic bound superpak aibum jumbo prints with your first roll zoc. Album Studios. Weatherford, Okia.

20C. Album Suddies, Westiferiotu, Osia.
FREE Mailers, 8 contacta 30c. jumbos40c. 12-45c. jumbos-55c. reprinta-1c.
San Francisco 1. Calif.
FILMS—Finest Quality—Fastest Serv1ce. 8-exposures 50c-12 exposures 75c-16
exposures \$1.00—enlarge to super size in
abum. Comera." Box 290-x, West Chestabum. Comera." Box 290-x, West Chestabum. Comera." Box 290-x, West Chest-

FREE! 8x10 enlargement with each two 120 or 620 rolls developed and printed; 8 Jumbos 30c; 12 Jumbos 40c, R. Bacon, Box 464, Westbury, L.I., New York. WENTY Wallet Size Prints any photo Empire, Box 33. Baldwin, New York.

33 MOTION PICTURES, SLIDES, SOUND EQUIPMENT

GUARANTEED Fresh 8mm roll, magazine; 16 mm roll, magazine movie film. Color, båcw. Free catalog, Eso-H, 47th Holly, Kansas City 2, Missouri,

Holly, Kansas City Z. Missouri.
FREE Giant catalog of Smm & 16mm films for home movie enthusiasts, Films in Willard Ave., Mt. Vernon. New York,
MOVIE Camera Film: 8 mm roll \$1.50.
films 100 *35.00. Free processing. Better
Giant 100 *35.00. Free processing.
TAPE Recorders. Tapes Accessories.
Unusual Values. Dressner, Box 66, Feeter Stuyveant Station. New York 9.
SIMM & Islands Foresson and Market Company of the Company of t

FREE! Blackhawk's summer sale cata-iog new and used 16mm. 8mm. films, used 16mm. sound projectors, new 2"x2" color slides. Blackhawk Films, 1146 Eastin,

Siddes, Blackhawk Films, 1170 Emount, Davenport, Iowa.

TAPE Recorders, Tape, Sound, Hifdelity Equipment, Radios, Wholesale, Belletonte Electronics, Box 761, Ashland, Ky.

34 CAMERAS, PHOTO SUPPLIES

VITO III. 12 ctd.. Brand New. \$114.50. Contessa, 12.8 CZT. factory boxed. \$117.11. Free catalogue. 1001 bargains. Dealer's Mart. 54 Beverly Rd.. New Rochelle. N.Y. PHOTOGRAPHY For Pleasure or profit, Learn at home. Practical basic training, Long established school. Free booklet, American School of Photography. 335 Di-versey Parkway. Dept. 1722, Chicago 14.

BASS Says: Quality Camera' Since 1910. When in Chicago visit the Camera Cross Roads of the World . . or write us for your favorite equipment new or used, Satisfaction Guaranteed. Bass Camera Co., Dept. AG 179 W. Madison Street, Chicago 2. Illinois.

DISCOUNTS to 40%—cameras, projectors, tape recorders, lenses, Write for individual quotations, no catalogs, Classified Camera E, 253 E, 94th Street, Brooklyn, New York.

20 TO 40% discount everything photo-raphic. Dart. 3812F Atiantic Avenue, Brooklyn 24 New York.

OIL Coloring Photographs—A fascinating hobby or profitable sideline for those with artistic talent. Learn at home. Easy simplified method. Free booklet. National Photo Coloring School, 835 Diversey Parkway, Dept. 172B. Chicago 14.

FREE Bargain Book packed with hundreds of fine photographic values. Write Central Camera Co. (Photographic Headquarters Since 1899), Dept 11H, 230 S. Wabash Ave., Chicago 4, Illimois.

ROLLEICORD III. 13.5 ctd. case. Brand New. original wrappings. \$99.90. Free catalogue. 1001 bargains. Dealer's Mart. 54 Beverly Rd., New Rochelle, New York. BETTER Pictures are easy using our low cost exposure meter. Se.id \$4.98. Rich-mond Enterprises. Box 1003. Augusta. Ga.

BUY wholesale nationally advertised cameras, photo supplies, thousands other products at big discount. Free "Wholesale Plan." American Buyer's, 629-SS, Linden, Buffaiol 6. N. Y.

CAMERA bargain—twin iens reflex with side mounted flash attachment and carrying strap, takes color or black and white pictures inside or out. Only \$6.45 postpaid—Money back guarantee. Le Noirs. 215 Broadway. Rock Springs. Wyo. WHOLESALE Photographic Supplies.
Cameras, Pilms, Projectors, Enlargers.
Write for Free Catalog. Capitol Photo
Supplies. 2428 Guadalupe, Austin, Texas.

MUSIC, SONG WRITERS

WANTED! Poems for musical settings.
Write Songwriters' Service. Clifton. N. J.
POEMS Wanted for musical setting.
Send poems. Free Examination. Five Star
Music Masters, 646 Beacon Bldg., Boston. Massachusetta

SONGPOEMS Wanted. Mail to: Tin Pan Alley. Inc., 1650 Broadway, New York 19, N.Y. SONGWRITERS! Protect your poems and songs! Don't mail anywhere! Write for saie procedure! Song Service. 333 W. 56th Dept. P.S. New York 19. N.Y.

FREE Record of your song—Your words—My melody. Free information, Johnny Street. Dept. K. Los Angeles 37.
FOEMS Wanted to be set to music. Free examinations. Send poems. McNeil, Master of Music. 510-PS, S. Alexandria, Los Angeles. Galifornia.

AMATEUR: Songwriters! Top - Notch Broadway Staff Offers expert professional opinion-suggestions for improving your song or lyric. Enclose \$1.00 with each manuscript or recording. Amsteur Song-writers Workshop. P.O. Box 359B. There Square Station. New York 36, New York. POEMS Wanted for Free Publication. Write for Free facts. Dept. B, Poetry Publishers. 446 Pearl Street, New York 38. SONGWRITERS! Send poems, songs. Music Service, 243 West 72nd St., PS. New York 23.

YOFK 23.

POPULAR Songs. How to write and sell them. Write for free booklet Successful Songriting. Cateway Songs. Box 2470. Hollywood 28. California.

WANT Songwriting Success? Your ly-rics songs, examined for publishing, re-cording possibility. "Success-Aid" sent Free, Meteor, 301 Allston, Boston 46, Mass.

1954 ACCORDIONS — Wholesale, Free, catalog, American Accordion Center, PS-8, 5329 Belmont, Chicago.

RADIO, TELEVISION, SUPPLIES & EQUIPMENT

NEW TV Catalog Free Loaded with bargains for TV servicemen, technicians, installers, Finest new TV antennas, Motorless Directronics, Multi-Channel Yagis, UHF Antennas, Converters, Motors, Boosters, Paris, Instruments, hundreds of quality accessories at money-awaine prices, Get your catalog new National Becommendation of the Condition of the Con

BUILD 15 Radios At Home only \$19.95 complete. Learn Radio Construction. Theory. Trouble-Shooting. Code. F.C.C. Regulations. Complete Radio Course includes all parts. components. Instruction Books etc. Free Radio Tester and Solder-Books etc. Free Radio Tester and Solder-ing Iron, you keep everything. No experi-ence required. Money-Back Guarantee. Order direct or send for descriptive litera-ture. Valuable Radio and TV Guide upon request. free of charge, no obligation. Pro-gressive 'Edu-Rius' Inc. 497 Union Ave. Dept. P5-20, Brooklyn 11, New York.

MAKE Simple, Tubeless, Batteryless, Distance-Getting radio, Genuine Melomite crystal, Detector, Illustrated instructions, 50c postpaid, Allen, 427-PS5, Clinton, Mo.

GUARANTEED Television, Radio tubes. Lowest prices ever. 6AU6. 6CB 50c: 12AU7, 8AG5, 8EC5 SSNTGT 68c. Free price list contains bonus offer, Voltage boosters, picture tube rejuvenators, an-tenna kits, low prices. Crown Television. Box 194, Hicksyllie, New York. price list boosters. I

FREE list. Bullder's pictorial construc-tion plans. Alena, 286 East Broadway. New York 2. GEIGER Counter and Metal Detector lts Inexpensive Educational, Free Lit-rature Electronic Applications, Dept. A. ox 4975, Washington 8. D. C. erature. Box 4975

CRYSTAL Radio experimenters. Write Leslie Hulet, R. 4, Lakewood, New Jersey. Lestie Hulet, R. 4. Lakewood. New Jersey.
REFAIR your own T.V. Prepared exclusively for your model. Plus introductory
bonus. Send make & model. \$1.00, T. Y.
POCKET Size Transistor Radio. Compiete with self contained speaker-plone.
34.459 postpaid. Electronic, Box 72, Lawrence, Mass.

FCC operator license quickly. Dept.-5. 64 Hollywood Blyd., Hollywood 28 California

EXTRA loud crystal set. Really separates stations. Plans 50c. Unusual electronics devices to build. List 25c. Missouri Electronics. 729 Lexington. Webster Groves 19, Missouri.

REPAIR your own TV. Instructions compiled exclusively for your set. Simple as replacing light bulb. Send set name, chassis, model number, \$1.95. LS Englineering, Box 4113-A, North Hollywood.

neering Box Tillering California.

COLOR Television! Enjoy low cost 3 color Television screen now. Easily attached. Free descriptive circular. Zingo Products. Johnstown 98. New York.

REPAIR your own TV! Instructions 2.00. Ray Television Service, P. O. Box 2. Radford Virginia.

MAKE your own Wrist Watch crystal adio! Instructions \$1.00. Alco. Route 2, Norfolk, Virginia.

37 BUSINESS OPPORTUNITIES

GOOD Paying Business Silvering mir-rors, plating autoparts, reflectors, bicycles, bathroom fixtures, etc. by late methods. No tanks or shop required, outfit fur-nished. Free Booklet. Gunmetal Co., Ave. E. Decaur, Illinois.

OPERATE profitable mail order business. Write Walter Service, 4159-B East 112th, Cleveland 5. Ohio.

LIVING miniature ("Ming") trees only 10 to 20 inches tall. Grow at Home. Big Profits! Spare time opportunity. Fascinating! Amazing! Write for Free Seed and Plan. National Nursery. Dept. CG, Ingle-wood 4, California.

REPAIR Dolls; make rubber stamps. Cataiog ''60 Ideas'' Free. Universal, Box 1076-B. Peoria, Iillnois.

ENVELOPES addressed accurately, reasonably. Fast Service. We have capable addressers in your city. Glenway System, 5713-X Euclid, Cleveland 3, Ohlo.

NEWEST Spare: Full-Time Business, \$5 to \$10 hour possible. Paint with Suedeto \$10 hour possible. Paint with SuedeBeautily auto dashboards. signs, radiotoys, figurines, lamps—1,001 others. Compiete. Sten-By-Step Instructions sent for
no-risk examination. Free details. Coast
1004-MH. So, Los Angeles 51. Los Angeles 15

IMPORT-Export! Opportunity, profit-able, world-wide, mail-order business from home, without capital; or travel abroad. Established World Trader ships abroad. Established World Trader snips Instructions for no-risk examination. Ex-perience unnecessary, Free details, Mel-linger, A698. Los Angeles 24.

MAKE Money spare or full time casting Make in you and novelles. But Money and offer a Markey Banks, etc., keeps manufacturers busy, Production moulds furnished for up to 100 and more castings maked to the control of the control of

VENDING Machines—No selling Op-erate a route of coin machines and earn amazing profits 32-page Catalog Free! Parkway Machine Corporation, Dept. 73, 715 Ensor St., Baltimore 2, Maryland.

RECAST old batteries into new. Latest hievements. Battery Laboratories, Minneapolis.

BREED Rare Tropical Fish at home. Earn Big Money! Learn Secrets! Help fill huge demand. Amazing Opportunity! Free Plan. Tropicals. 1008-G Los Angeles St.. Los Angeles 15.

FIX typewriters. Free booklet describes our modern, inexpensive home-study course. Factory methods taught. Write Typewriter, Building 4, Tarentum, Penna. \$25 WEEKLY working two hours daily home. Lycke, Box 2471-B, Cleveland

at home. Lycke. Box 2471-B. Cleveland 12. Ohio.
BRONZED baby shoe metallizing equipment. New and used. Big selection or metal and only mountings. Fig. 1624-A E. First Street, Los Angeles 35. California E. First Street, Los Angeles 33, California WE Love our mailman—He leaves over 31,000.00 monthly in our rural mailbox. My office for the control of the cont

"INCOME" from local information. No elling. Write Neherco, Laverne 6, Calif. Selling. WOMEN! Make Big Money at home. Sew ties for us. It's fun. Earn \$10 day easy. No selling, no experience, no machine necessary. We supply everything. Help us fill huge demand. Exciting details free. Fashion Ties, 2521-X Manchester, anglewood 4, Calliornia.

nglewood 4. California.
FREE: "301 Profitable Small Busi-iesses!" Amazing shoestring plans! Work-flome! Start Sparetime! Deumant Sur-iess, Kenmore 28-T, New York.

MAKE Money At Home as renewal head-quarters for all magazines. Liberal com-missions. No experience—No capital needed. Supplies furnished. Write for Free Catalog. McGregor Magazine Agency. Dept. 510B. Mount Morris. Illinois

LEARN Sewing Machine Repair, electri-fy, trade, sell. How to make Big Money at home sparetime. New zigzag machines, parts, etc. wholesale. Free details. Taylor Service. Hamilton PS-8. Ohio.

ADDRESS Advertising Postcards. Must have good handwriting. Box Nine, Water-town, Mass.

NOTARY Public appointments. Our 25th year. Inquire: Stationers, Helotes, Texas. MEN Wanted—Build Luggage And Cases At Home. We sell your products—supply complete instructions, materials, every-thing. No special equipment needed, Free details, Casecraft, 805-H8 Sunset, Los An-geles 12, Calif.

geles 12. Canii.
TO \$40.00 weekly. Sparetime. home op-erated mailorder business. Successful "Be-ginner's" plan. Everything supplied. Lynn, 10420-C National. Los Angeles 34. Calif. MINK Raising information free. Com-plete. Lake Superlor Mink Farm, Supe-rlor E E5. Wisconsin.

HOW and where to obtain Capital? Free details. Star Service, Wapakoneta, Ohio. MAILORDER—Operate profitable home business using Free Advertising Method. Revealing Information free Seidel, 7070-HG Hollywood, Los Angeles 28. WOMEN Wanted to sew ready-cut neck-wear. Material furnished! No selling! Help fill huge demand. Details free. Neckwear Supply. Box 1455-C, Las Vegas, Nevada. POPCORN and Potato Chip Ecutipment. LECo. Box 933-B. Springfield. Ohio.

BECOME A Game Warden, or join For-estry, Park. Lookout, Wildlife Conserva-tion services. Enjoy outdoor work, good pay, real security. Complete information Free! Write "Home-Study Institute." 3156AT West Eighth. Los Angeles 5. Caiif. GUATEMALAN Typical handmade prod-ucts: Leather bags, belts, skirts, etc. Mall orders filled. Dealers inquiries invited. Free catalog. Mapilon, Box 268. Guate-maia, C. A.

METALIZE Baby Shoes, jewelry, gifts. Bronze, gold, silver, Free bulletin, Kik-tavl, 7217-SY South Broadway, Los An-

BUY Wholesale! 38-06/C Jissounists
Free! Large Catalog of Nationally advertised appliances. Oiffts, Watches, Jaweiry, and the state of the state of

\$40.00 DAILY with \$88.00 Sawshop Equipment. Zapart. 586-PS Manhattan, Brooklyn 22, New York.

THRILLING Profitable Home Business. Make fast-seller chenlile monkey trees, dolls, flowers. Terrific holiday demand. Information free, Velva, Bohemia 17, N. Y. BUY wholesale direct 10.000 nationally advertised Appliances, Sporting Goods Watches, Furniture, Auto Parts, Toys Giftwares, Sell at tremendous savings to individuais, organizations. Amazing Prof-its! Free "Wholesale Idea". National Buyers Service, Box 426FB, Oakland, Calif. EARN \$100 month, easy, breeding hybrid earthworms. Big demand. No expenses. Free information, Earthworm Gardens, 36 Peacock Bldg., El Monte, Calif.

\$40 TO \$60 from one bundle cedar shingles. Plans & details for \$1.00, R. Stecher, 507 Bell Street, Indianapolis 2. Indiana

OWN your own profitable wholesale mer-OWN your own profitable wholesale merchandising business. Investment experience unnecessary. Sell 5.000 famous nationally advertised products everybody buys. Your own name catalog. We drop ship orders. Free details. General Wholesalers. Box 1195FF, Chicago or Box 3058FP, San Francisco.

SAWDUST. Turn it into cash. Twenty methods. Instructions 50c. Charles Com-pany, 12-ECH, Norwood. Ohio.

THE Real Truth About Mail Order 25c. postpaid. Grason Dilworth, Dept. 22. Monkton, Maryland.

ADVERTISING book matches—Cash in on big demand—seil Union Label matches Cuts for all businesses and political par-tless—Free powerhouse selling kit—low prices—protection guaranteed on repeat orders—Cash commissions. Superior Match Co., Dept. PX-884, 7380 Greenwood, Chicago.

NATURAL molding rubber, extra thick. Free sample. Flock. W. Wooley, 115-B Donald. Peoria. Illinois. LIQUID Rubber make flexible molds. Free Sample. Chaney, 1130 E. 16th St., Jacksonville 6, Fla.

MAKE Periumes Other Profitable Prod-

Louis 3. Missouri.

LAUNE 3. MISSOURI.

EARN \$15.000-\$30.000 Annually. Franchise protected. Guaranteed minimum \$12.500 or money back. Live at home. No of the most exclusive and noncompetitive businesses in United States and Canada. Send for free explanatory booklet. Harreil & Company. Box A-2. Louisville. Illinois.

MAKE flexible molds. Cast plaques, fig-urines. Free sample, Tooker, 630-A Chest-nut, Hamilton, Ohio.

WANTED: Home Producers by manufacturers in our Clearing House Surface, Become subcontractor, casting plastic products for these companies. Thousands of easy-to-make tenns required for convenient of the convenience of the c

BUY Wholesale—sell retail Brand Name appliances, watches, etc., Full details— Catalogue 50c. International Sales Co. 175-B Fifth Avenue. New York 10. N. Y.

START A Buying Service, buy whole-le thousands nationally advertised prod-cts. Make big profits seiling at sizeable iscounts, Postcard brings details, Ameri-an Buyers', 627-S Linden, Buffalo, N.Y.

MONEY in new greaseless doughnuts. tart in kitchen. No smoke. Sell stores. 'ree recipes. S. Ray Co., 3605 South 15 ve., Minneapolis 7, Minn.

GET \$10.00 Orders by Maii! 100% profit! verything furnished, Terrell, Bogard, verything Missouri.

MAILORDER "How-To" Small capital, sparetime, home beginners handbook 25c. Satisfaction guaranteed. Bailard Service, 425 East Saint Catherine, Louisville 3. Ky. BOOKKEEPERS! Keep books. Smail firms. Spare time. Heffernan, 37-02 Jeru-salem Avenue. Wantagh, New York.

salem Avenue. Wantagh, New York.
\$200 WEEKLY, New Invention, Amazing
4-second Presto Emergency tire chains, fit
all modern auto wheels. National advertising building big demand. 3 sales daily
to oil stations, dealers, etc. make \$200 or
more weekly. Territory going fast, Write
2. Lows.
SELL To Car Owner: By Mail. Full. Instructions— Everythine, supplied—Orders
therefore— Everythine supplied—Orders

SELL To Car Owners by Mail. Full in-structions — Everything supplied—Orders filled. Big earnings. Write: Skidmore. 121 Pine. Elizabethton, Tennessee. "MAKE Perfumes." other products—Self mail order—Formula Catalogue Free. The terrorational." 6347 Parneli-PS-6. Chicago

ional' ternational 21. Iiiinois.

TRADE Magazines See current copies TRADE Magazines. See current copies through our easy to get acquainted service. Choose from 4.387. covering all fields. Current List Free. Commercial Engraving Publishing Company, 34S North Ritter. Indianapolis 19, Indiana.

MONEY in saw sharpening sparetime at MONEY in saw snarpening sparetime at home. Repeat cash business, Experience unnecessary, No seifing. Free bookiet ex-plains. Charles Foley Company, Columbia Heights. Minnesota.

LEARN Invisible Reweaving! Harris Re-eavers, P.O. Box 7112. New Orleans 19. Louisiana

FRANCHISE opportunities nationwide. Fascinating, profitable business affiliations. Request information immediately. National Franchise Reports. R. 810, 920 North Michigan Avenue, Chicago 11, Illinois.

CO-PUBLISHING moneymaking oppor-tunities! 10c. P.M.T., 612 Rogers Street, Albemarle, North Carolina.

Albemarie. North Carolina.

COLORGIAZED Concrete pottery made
without molds. Patented method. Cemetery products, novelties, titles. Basement.

tery products, novelties, titles. Basement.

ter, details free. Men only, National Potteries. Grand Rapids "Minnesota."

\$250 WEEK reported! Free book "565
Odd. Successful Businesses," Work home!

Expect something Odd! Pacific-36C.

Oceanside. California.

Oceanside. Galifornia.

WANTED qualified men to be our facWANTED qualified men to be our facWANTED qualified men to be our factige independence, financial success. Start
introducing the famous wattage regulators. Make spare time worth \$1000.00

\$1000.00 weekly and up. Details on request.
\$1000.00 weekly and up. Details on request. Electric Co., Box 2162-BD, Clevenanu c. C., JAPAN Imports! Unusual products in-deed! Airmail \$2.00 Postal money order for valuable samples and catalog. William Exports. Box 89 C.P.O., Tokyo, Japan. EARN \$2.00 Hour! I do-making San-als. Youngs. 1308-PS South First, Ardais. Youngs, 13 cadia. California.

MANUFACTURE Greeting Cards. At-active, different, Sells easily, big profits, nail capital. Start in home. Complete an \$1.00. Litho Publishing Co., 7811 urora. Seattle. Washington.

"HOW TO Build Your Own Mailorder Business". Booklet 25c. W. Jensen, 3578 So. 25th East, Sait Lake 6. Utah. GET Dollars In Your Mail . . . Keep Every Cent—Orders Filled Free. Genmerco. Box 142. Dorchester 24-C. Mass.

START Venetian Blind Laundry. Prof-itable lifetime business, New machine. Free booklet. F.D. Co., 442 N. Seneca, Wichita 12, Kansas,

SELL Books. Merchandise By Mail. Good Profits. We furnish circulars, names—ship your orders. National, Box 88, Dor-chester, 22H. Mass.

PLASTERCRAFT moids, liquid rubber, plasters, flocks, candle supplies, Catalog and mahual free, Jayhawk Plasters, Blue Rapids, Kansas,

HAVE Home Mail Business—Get \$10 Orders in Every Mail—Keep \$8.00. Everything furnished. Hutchison, Box 87-C, Dorchester 22. Mass.

FREE Folio "\$45.000; Unlimited Vacations Plan." No canvassing, maliorder, merchandise, equipment, Unknown, Works itself—home! Keep job, Haylings-PS, itself—home! Carlsbad, Calif

ELECTROPLATE autoparts, novelties mirrors, baby shoes. Easy, inexpensive home processes. Free bookiet. Tyco Metals, Box 13231-CQ, Houston 19, Texas.

NEW-Different Home Business Oppor-tunity! Address-Meil Literature Featur-ing Reai Merchandise. Everything fur-nished. Mills. 1752-B. Garden Avenue. Lorain. Ohio.

MONEY Typing—Sewing! Details free. Edwards, 3915-PS, 12th, Des Moines 13.

PATENTED idea, Turn discarded tires into beautiful flower receptacies. New unusual. Worldwide opportunities. Details loc. Tirecraft. Box 179-A. R.=2. Piant-City. Florida.

\$\$\$\$ IN personalized baby record books. \$838 IN personalized baby record books, Seil by mail. Eleven thousand new pros-pects daily. Use same literature we do. No-Co-Ro. Oakland 6-P. California. OPERATE "escolator" Mailorder Sys-

tem. selling our products or any products. Very fast. Write: Seibyco. Decatur 20U. Ili. UNUSUAL homework opportunity. Spin-ning angora for us. Men. women. spare-time. Angora House. PSM, Springfield, Ill. RAISE Earthworms!! Easy! Profitable! Dime brings information, unusual True Story. "An Earthworm Turned His Life." Earthmaster System, 14E. El Monte, Calif.

\$1.00 MAILORDER Item. Light Malier. Prospects. Every Home, Circulars Furnished Free. Gordon Products. Box 1022A. Syracuse 1. N.Y.

HUNDREDS of ways to make money! Send for folder "A". Hilitop Products, Room 940-P 30 West Washington Street, Chicago 2. litinois.

TELEVISION repair business. \$39.50 to-TELEVISION repair business. \$39,30 to-tai cost. Amazing one-day training, no studying. Proven technique. Make \$15 to \$20 day immediately! No experience needed. Investigate! Free home business pian. Write LS Engineering. Box 4113. Dept. PS-8. North Hollywood. California. BUY it wholesaie. Manufacturers. Distributors. Over 850.000 items. Literature free. Olsen. 1231-B East Third St., Duiuth Minnesota.

BUY wholesale receive big profits—get "Sure-Way" methods \$2. Eneira, 336 Coidbrook, Grand Rapids, Michigan. \$60.00 WEEKLY addressing postcards. instructions 50c. Roland. Box 381, Park-iand. Penna.

GROW Mushrooms. Cellar, shed, and outdoors. Spare, full time, year round, We pay \$3,50 lb. We paid Bubbitt \$4,165.00 in room Ind. Dept. 178, 2954 Admiral Way. Beltie. Washington.

BIG Money. Home Plastics Business. Free Catalog. Bing Products. PS-854. Watertown 72. Mass.

PYRAMID your earnings, stamped en-relope, 19409 Cherokee Avenue, Cieveland,

HOW to build your own mail order business. Don't experiment—send 25c for booklet and "Know how." Cecil F. Giover, Union City 1. Penna.

\$46 FROM Square Foot Plywood; Jigsaw necessary. Write: Woodart. Bridgewater,

set of RUM Square Fool Plywood, Jigsaw mecessary. Write: Woodart, Bridgewater, Massachusetts. BUY Wholesale Thousands Nationally advertised products. Exclusive large cata-log \$1.00. Hamilton Sales Company, York, Nebraska.

MONEYMAKING OPPORTUNITIES

ALUMINUM Awnings. Seil yourseif. Seil neighbors. Factory prices. Write Ail Weather. Box 10254, Tampa. Fiorida.

SPARETIME Profits Taking Subscriptions. Ail Magazines, Wholesaie Catalog Free. Cassell Agency. Westfield 1. N. J.

SELL Titania genes, \$9.75 carat whole-sale. More brilliant than Diamonds. Free catalogue. Diamonite 1404-S Mitcheli. Oakland 1. Calif.

FREE! "301 Profitable Small Businesses!" Amazing shoestring pians! Work Home! Start Sparetime! Deumant Surveys. Kenmore 23-T. New York.

ADDRESS Advertising Postcards. Must have good handwriting. Box Nine, Water-town, Mass,

NEW 7"x11" Ultra-Biue Signs. 7c, retail 50c. Sample free! Lowy, 812 Broadway, Dept. 307, New York 3. LUCRATIVE hobbies, book-list free, honback, 2737 Clement, San Francisco Shonback.

21. Caiifornia. 21. Oatifornia.

BUY Wholesaie! 30-80°; Discounts!

Free! Larse Catalog of Nationally adverting the state of the state of

JOIN The Profitable Hobbies Prosperity Club. You keep the dollars for profit. In-formation 10c. A. Andolino, 210 Portland Ave., Rochester, New York.

DEFECTIVES Earn Big Money. Experience unnecessary. Detective Particulars free. Wagoner. P-125 West 86th. N. Y. 24. BUY wholesale direct 10.000 nationally advertised products. Save yourself 50%. Make big money selling others. Free "Wholesale Idea". National Buyers Serv-ice. Box 246FC. Oakland. California.

BAR items and Bar gags at wholesale, resell at 40% profit. Collins Products, Dept. 2. Box 465, North Hollywood, Calif.

MAKE money addressing envelopes paretime. Gienway, 5713 Euclid, Clevesparetime. G

WIN contest money, General Contest Bulletin gives hundreds of tips, Lists cur-rent contests and rules, Sample 25c. Gen-eral Contests, 1609-A East 5th, Duluth,

MANUFACTURE Rhinestone and Pearl Jeweiry at home. Latest creations, tremendous profits, no skill needed. Postcard brings illustrated catalog of settings, stones, etc. A. V. Cutt Co., Inc., 210-H Fifth Ave., New York 10, New York.

EXCEPTIONALLY Profitable Home Mail-order Business Plans. Lewis Bartlett. Richland, Georgia.

FREE Wholesale price information. Nationally advertised merchandise. Speedway. 2320 N. Raynor Ave., Joliet. Illinois.

2320 N. Raynor Ave., Jollet, Illinois.

MAKE to \$4.50 hour doing common pentetreins. National Artists. 801½-C North

Particles. National Artists. 801½-C North

EARN Money Feenings. copying and
duplicating comic cartoons for advertisers.

Askervice. Argyle 2, Wisconic buy wholeucts. Make bis profits selling at sizeable
discounts. Postcard brings details, American Buyer's Globel Linden, Butfalo, N. X. SMALLER Faycheck? Add to your in come. New pian. Plastics. Dept. A3, 1002 Mayfair Drive St. Louis 21. Missouri.

GUARANTEED moneymaker at home, work, school, etc. Write for sample offer, Petee's, Box 833, Toledo, Ohio. DOLLARS in your mailbox daily, no stock investment, plan \$2. Gem. 44-B Atlantic, Pieasantville, New Jersey.

START majiorder business without capi-

START mailorder business without capi-tal. Free advertising method shows how. Write: Box 2001. Lawton. Okiahoma. 835 WEEKLY addressing envelopes. In-structions \$1. refundable. Adservice. Spring Valley 36. New York.

TEN Magic Words has brought others weatth health happiness. This simple scientific principle can also help make your success—easier quicker. Magic words plus complete instructions \$1.00. Litho Publishing Co., 7811 Aurora. Seattle. Washington.

FREE Book "505 Odd Successful Businesses." Work Home! Expect something Odd! Pacific-35C. Oceanside, Calif.

\$200 MONTHLY Possible Raising Earthworms! Backyard, Garage, Basement, Complete, Illustrated Booklet explains raising, feeding packing, marketing, 25c postpaid! Ozark Worm Farm-V, Willow Springs, Missouri.

EARN \$1.50 per order by just address-ing envelopes. For information send stamped envelope to Box 1428, Mobile,

MAKE money at home, Write, Palcon ouse, Winnebego 4, Illinois,

FREE Folio "\$45.000; Unlimited Vaca-tions Plan." No canvassing, mailorder, methandise equipment. Unknown, Works itself—home! Keep job. Haylings-PS, Carlsbad. Calif.

MAKE Big Money Raising Parakeets for our market. Positively no selling. Birds, instructions furnished. National Aviaries, Box 4897-S. San Diego 4. California.

MAKE big money at home. No invest-ment. We supply everything. Full details \$1.00. Blind Industries. 3398 Frederick. Detroit 11, Michigan.

UNLIMITED Earnings, operating prac-tical mailorder plan; small capital, details free, Lianerch Sales, 24 E. Langhorne Ave. Havertown, Pa.

35.00 HOUR no selling Roland. Box 361. Parkiand Penna.
GROW Mushrooms. Cellar, shed, and GROW Mushrooms. Gellar, shed, and the pay 32.50 lb. We paid Babhitt 84.155.00 in lew weeks. Free Book. Washington Mushroom Ind. Dept. 179. 2954 Admiral Way. Seattle, Washington.

Seattle, Washington.

EASY living mailorder method brings high income monthly, Others work for you. We supply everything. Complete instructions and sample \$1.00. Dar-Craft, Box 268, Monroe. Washington.

FUTURE Security! Learn Watch-Clock Repairing at home. Inquire. Modern Tech-nical Supply. 55-PS West 42nd Street, New York 36.

\$15 AN Hour preparing tax returns. Experience unnecessary. Details Free. Union Institute, 1M. Lakewood, N. J. FORMULAS, PLANS, ETC.

FORMULAS—All kinds. Latest products. Literature free. Kemico, Park Ridge 15. Iil. FREE Formula Catalog. Anything analyzed \$35.00. Western Chemical. Saiem. Ore. LATEST modern real manufacturing formulas, list free, Moon, Martville, N.Y.
FORMULAS, \$2.50, Richard Hein, Chemist, 250 Argyle Street, Valley Stream, New York.

MODERN formulas for today's fastest selling big-profit products. Literature free! Miller, Chemist, 1517-A, Tampa, Florida.

PLASTICS

PLEXIGLAS. Lucite. Any size sheets. Square foot (12x12) cost. 1/16". \$1.18: 1%", \$1.55: 3/16". \$1.90: 14". \$2.25. Add 15% for postage. Minimum order \$3.00. Aimac Plastics. 600 Broadway. New York City. PLEXIGLAS sheets—cut to size—clear, il thicknesses—standard outdoor transcent colors. McClarin Plastics, P.O. ox 168B. Hanover, Pa. lucent

PLEXIGLAS, Fiberglas, Polyester, Acetate, Vinylite: Casting, coating plastics; Past service, wholesale-retail prices, Catalog ide, Gem-O-Lite, Box 6862P, North Hollywood, California.

Hollywood, California.

PLASTICS home-craft course for Men and Women. Tells and shows how to make and Women. Tells and shows how to make and the state of the sta

CASTING plastic, crystal like, new improved formulation, 1½ pounds liquid Nuproved formulation, 1½ pounds liquid Nuproved and instruction manual. You too can start profitable casting and embedding hobby at home. Only \$6.00 potspaid, send to Virginia Research Laboratory. Dept. B8, Marion, Virginia.

FIBERGLAS-resin materials included in our complete plastics catalogue. Van Horn Plastics, 1905 Ingersoll. Des Moines,

41 CHEMICALS & APPARATUS SEE Cosmic Rays. Watch Radio Activity At Work. Laboratory Certified Cloud Chambers \$9.75. Free Brochure. Atomic Laboratories. Box 343. Berkeley,

California. NEW Idea Chemical and Apparatus Out-fits for Home Experimenting Photo-Scales. Microscopes, Chemicals, Biological and Laboratory. Supplies in Small Quantities. Catalog 25c. Established 1931. John H. Winn. 124-B West 23rd Street. New York. N. Y

ILLUSTRATED Catalog: Chemistry, mineralogy, biology 20c. Tracey Labora-tories, Evanston, Illinois.

CHEMICALS and apparatus for industrial. analytical and private laboratories. Catalog 25c. Dept. M-26, Biological Supply Co., 1176 Mt. Hope Ave., Rochester 20, N.Y. GEIGER Counters. \$29.95 up. Free Cat-og. Atomic Laboratories, Box 343, alog. Atomic Lap Berkeley California.

HELP WANTED

883-8. Mollywood 28, Calif.
ALASKA! Last American Frontier.
5,00 brings 1854 Business Directory &
Construction, Homestead & Highway Instr.
Imber. Travel directions, List of firms.
Timber. Travel directions, List of firms.
Box 82-8, Hollywood 28, Calif.
ADDRESS Advertising Posteards, Mush have good handwriting, Box Nine, Water-town, Mass.

towa. Mass.

CALIFORNIA Employment. California's population increasine over 400 000 a year population increasine over 400 000 a year your arrival. Complete lattings. information. \$1.60. Satisfaction guaranteed. Mid-FOREIGN U.S. Jobs - So. America. Alaska, Spain. Fare Fald. 100°s U.S. Jobs to \$18.00. Trades, Office. Factories. Serio trades. Middle of the State of the

SOUTHERN California—Job opportuni-ties or Business opportunities, Real es-tate and Rentals, Air Mailed—\$1.00. Ar-nett, 1923—8th Avenue, Arcadia. Calif.

MEN Wanted New for Foreign Construction employment on American Bases in Europe. South American Fars North and Clurkes. 83:00 hour. Carpenters. 83:70 hour. Laborers. 83:00 hour. Many other trades wanted with wave rate accordingly. Up to all over 40 hours. Transportation paid. 8 to 24 month contract. Also jobs with Ship-tion jobs in U.S.A. with wase rate in 71 of the larger cities. Full information of all pile contract. medical examination. applica-cation form. etc. Air mailed to you for only 83:00 Foreign Construction Eduletin. 2824 PER Week overseas; Clerks. truck 2824 PER Week overseas; Clerks. truck MEN Wanted Now for Foreign Construc-P.O. Box 393. Dept. 28, Dallas. Texas.
2435 PER Week overseas: Clerks. truck
drivers, cooks. construction men. guards,
office workers, laborets, carpenters. etechers,
tions. Mos experience needed some jobs. 257
projects. 51 countries. Plus latest bulletin,
"Firms Seeking Applicants." Complete information, Illustrated. 56 pages. applications, 81, 305service, D-1, Box 30, Billings.

Montan.

\$1300 MONTHLY for truck drivers, \$1400 monthly for carpenters, electrociers and laborers. Replacement hirms now being done. Pull information and formation on Spain, Korea, Australia, Alaska & Canada, \$1.00, 10.000 men and Compite information and other domestic intrins, \$1.00, Dept. 4-H. Opportunities Unitimited, 110 commerce Bidg. St. Paul.

"ATTENTION Construction Men!!"
Truck Drivers—Carpenters—Mechanics—
Electricians—Cirks—Piumbers—Labores
Electricians—Cirks—Piumbers—Labores
Latest Copyrighted Reports on who to
contact for highest paying jobs in over 42
America, Aiaska, Europe, Africa, etc. Pay
up to \$1550,00 monthly. Transportation
overtime, many other advantages. One
year registration and advisory service Appilication forms. Only service with unconfaction. Immediate service, ail only \$2.00
Almail \$2.25. (COD's accepted). Inter1, Missout!—Drivers. Box 100-157. St. Louis
Piumbers. Description.

LATEST employment information Greenland. Interest Rehires. Spain, Alaska many others listed, \$1.00. Foreign Job Information Service, Box 657, Minneapolis, Minnesota

CHICAGO has the jobs. Heip Wanted columns airmailed \$1.00. Mortensen, Box \$417. Chicago, Illinois. NORTHERN Jersey Help Wanted and Housing columns \$1.00 airmailed. Adserv-tee. 327 Stellen Avenue. Ridgewood, N. J.

AGENTS WANTED

AGENTS-300% profit selling genuine gold window letters; stores and offices. Free samples. Metallic Sign Letter Co., 431-E North Clark. Chicago.

START Your Own Business on credit. Your own boss. 1658 of our Dealers sold \$5.000 to \$27.500 in 1953. We supply stocks, equipment on credit. 200 home necessities. Sales experience unnecessary. Pleasant. Traditable business backed by world-wide equipment on credit. 200 home necessities. Sales experience unnecessary. Pleasant. profitable business backed by world-wide industry. Write Rawleighs. Dept. H-U-PSC. Freeport, Iil.

NEW Jobs open in selling! Send name, address for five free Issues of Opportunity Magazine's money-making guide. Histing hundreds of companies who'il pay you well, full or part-time. No experience needed Opportunity, 28 E. Jackson, Dept. 18, Chicago 4, Illinois.

ABSOLUTELY Free—Sales Kit. Yours for the asking. Send postcard teday re-questing kit showing new line, belt buckles with your name or personal ini-tials, cap badges, choice 3000 different em-blems. Write Hook-Fast, Box 1425PS, Providence, R. I.

GOLD or Silver letters, numbers. Windows, Doors Trucks, 1" to 6", 500% Profits—Free Samples, Atlas-U, 544 West 79th, Chicago 20. IS \$218 a week worth a postcard to you?

Is \$218 a week worth a postcard to you?
Then rush card with name and address for special Free Trial Plan that sells amazing new Automatic Refrigerator Defroster "like hot cakes!" Write to Mr. Lewis. De-Frost-O-Matic Corp. Dept. P-103, 173 W, Madison. Chicago 2, Illinois.

W. Madisca. Chicago 2: Inimois.

GOOD man can make \$3,000 next 90
days. Every house in town wants amazing
Nilite glowing curbside numbers. Automatic free trial plan pays profits day
after day. Write for free details. Nilite,
173 W. Madison, Dept. \$02, Chicago 2, Iil. HAVE a complete store in your pocket. Buy wholesale and make big profits. Send for free general merchandise catalog now. Jay Norris. Dept. PS. 445 Broome St., New York City.

York City.

MONEY For Xmas! Make \$50 and more during spare time. Friends, neighborsew Sparkling Line. Imprinted Christmas Cards for As Little as 3c. Personalized Stationery. Mapkins. Larre Citi. Wrap-more Stationery. Mapkins. Larre Citi. Wrap-more New York.

at fine quality Money Saving Values. No experience Needed. Send Name and sortments on Approval. Bonus Plan. Elmin's "Portlabe Citi. Stopy. Makes Money Card Co., Dept. C-204. Elmira, New York.

"""S to terrify you" la etually self. Thous.

IT'S so terrific you'll actually sell Thou-sands! Brand new \$2.95 pocket check pro-tector. Sales pouring in. A tremendous deal for you. Get your town today. Federal Products. Evanston 15. Illinois.

CHRISTMAS Cards pay 75c profit on \$1.25 assortment. Exclusive 40 for \$1 Name Imprints; 0fit Wraps By-The-Yard; 200 new fast-sellers. Cash bonus. 5 Assortments on approval. Cardinal, 1400 State, Dept. 80-L, Cincinnati 14.

NEW Bathroom Deodorizer, Hangs on wall. Banishes odors bathroom, kitchen, Lightning seller, Samples sent on trial. Kristee 58 Akron, Ohlo.

ADDRESS Advertising Postcards. Must have good handwriting. Box Nine, Water-town, Mass.

ANYONE Can Sell famous Hoover ANYONE Can Sell tamous Hoover Uni-forms for beauty shops, waltresses, nurses, doctors, others, All popular miracle fab-rics—nylon, dacron, orlon, Exclusive styles, top quality, Big cash income now, leal future, Equipment free, Hoover, Dept. E-101, New York 11, N. Y.

Dept. E-101. New York 11. N. Y.
BIGGER Profits selling Greeting Cards.
Get list of sensational Factory Surplus
Baragins, 31.25 boxes for 50, 51 boxes for 70
250-while they last; Big line new 1954
Christmas Cards. Stationery, Offix. Assortments on approval, Personalted Samton, Dept. H-136, 81. Louis, Missouri.
70 NEEDLEBOOK with threaders 87.20
gress 31 bieze pulsais Christmass decorate-

70 NEEDLEBOOK with threaders \$1.20 gross, 31 piece plastic Christmas decorating kits \$3.00 for 10 sets. 5.001 other Bargains. Many samples & catalog \$1.00. Milis Sales. 26 West 23rd Street, New York.

BIG Money making opportunity. Exclusive line work uniforms. Jackets, pants, shirts, coveralis. Advertising embroidered. Every business prospect. Outfit Free. Master Div., 264 Water. Ligonier, Indiana.

\$10,000 PROFIT Selling Printing,
Matches, Specialties! Arrow dealer tells
how he did it in glant free sales outfit.
You can do it too—without experience.
Write Arrow Press, 521-B Fourth Ave., So.,
Minneapolis. Minnesota.

AMMAZING Profits For You stilling Sun-AMAZING Profits For You stilling Sun-ment or experience necessary. Nationally Famous 2I Cards for \$1.00. Sells on Sight! Imprints. Currier-Ives. Religious. Citt. write: Sun-shine Art Studios. Inc., Dept. Write: Sun-shine Art Studios. Inc., Dept. PS-8, Springfield 1. Mass. Pasadena 3. Calif. (Note: East of Rockies address Springfield Office.)

CALENDARS. Advertising Novelties, Matches. All styles, including Religious. Varnished. 12 sheet. Girls. Hundreds of Advertising Novelties. Book Matches. etc. Fleming Calendar Co., Promotional Division. 6539 Cottage Grove. Chicago 37, Ili.

MAKE Money At Home as renewal head-quarters for all magazines. Liberal com-missions. No experience—No capital need-ed. Supplies furnished. Write for Free Catalog. McGregor Magazine Agency, Dept. 510A. Mount Morris, Illinois.

Dept. 310A. Mount Morris, Illinois.

MAEE Money Fast—for yourself, church, organization and all closures and all closures and all closures of the state of the st

ADVERTISED watches, diamonds, pens wholesale. International, 61M Roberts, Portland 4, Maine.

Fortland 4. Maine.

SELL New 3-Dimensional "action"
Christmas. Birthday. Get Well
Christmas. Birthday. Get
Christmas. Get
Chri

ngton 835-B. Mass.
RUN spare-time Greeting Card and Gift Shop at home. Show friends samples of our new 1864 Christmas and All-Oceasion of the Shop of the Shop of the Shop of the ders and earn to 100% profit. No experi-nce necessary. Costs nothing to try. Write today for samples on approval. Re-sal Greetings. Dept. 105. Perndale. Mich.

BUY Wholesalet 30-80% Discounts!
Free! Large Catalog of Nationally advertised appliances, gifts, watches, jeweiry, street appliances, gifts, watches, jeweiry, etc. Start your own fully self-operating mail order business without capital Wholesale starting tits furnished. No extomatic saise plan included Consolidated Distributors, Division 121, Box 1537, Paterson 15. N. J.

SHINE Shoes Without "Polish". New invention, Lightning seller, Shoes gleam like mirror. Samples sent on trial. Kristee 59. Akron, Ohio.

59. Akron. Ohio.

CASH Commissions—Up to \$10 per hour. Sell new and exclusive Ortho-Yent business places, industries and individuals offering them America's most comfortable shore. High commissions, cash of the commissions with the commissions of the commissio

GET Into Toys! Show sensational toy fiannel-back tablecloth. Free toy gift line. Take orders. Juicy profits. Styleco, Dept. T455. Cincinnati 10, Ohio.

100 CHRISTMAS cards \$2.25. Agents anted. Wade, Box 3006. Greenville, Miss. SEND postcard for Free Money-Making Kit guaranteed direct-from-Mill nyions, lingerie, blouses, men's and children's wear. American Mills, Dept. 430, In-

dianapolis.

CALIFORNIA sweet smelling beads, sensational sellers. Particulars free. Mission. 2028.

PORTICOL Los Angeles 6, Calif. 1928.

PORTICOL Los Angeles 6, Calif. 1928.

PORTICOL 1929.

MAKE Money Introducing World's cut.

Make Money Introducing World's Medical States and the Mission of the Mission of

\$9.90 PROFIT per dozen. Sell magnetic encils to waitresses, clerk. Nicholson orporation, 3405 Cahuenga, Hollywood pencils

START your own money making discount business. Buy wholesale nationally advertised Appliances, Watches, Giftware. Experience, investment unnecessary, Sales unlimited. Free "Wholesale Idea". National Buyers Service. Box 426FM, Oakland, California.

EXOTIC African Import! Beautiful, genuine handcarved saiad set direct from Africa. Retails for \$5.00. Sample \$3.00 postpaid plus quantity prices. Knuppel, 45 Westbury Avenue. Mincola, New York. REVOLUTIONARY! Exclusive! New York. REVOLUTIONARY! Exclusive! New economical safety auto accessory. Instant seller. Glant profit pian. No competition. Territories open. Parnat Machine Works. 1816 Vyse Avenue. Dept. PS-16. New York 60. N. Y.

60. N. Y.

EASY Extra Income—Seil Sensational
New Silicone Scorch Resistant Ironing
Board Cover. Good Housekeeping Approved. Terrific \$1.98 seller! Send for Free complete selling Kit. Sample cover \$1. Meneil Products. Dept. X-P.O. Box 4 Midtown Station, New York 18, N. Y.

EASY handwork makes fast-selling useful articles. Sample free, Sunmade Company. Brockton 64. Mass.

BUY Wholesale thousands nationally advertised products at big discounts. Free "Wholesale Plan." American Buyers', 629-S Linden, Buffalo, New York.

SENSATIONAL Wholesale watches, rings, appliances. 1954 catalogue 50c. International Sales Company, 175-BA Fifth Avenue, New York 10.

A Postcard Can Put You In A Fine Businessi Complete line. Leather Jackets. 160 shoe styles. Big commissions. No experience, no investment. Send postcard for Free outfit. Mason Shoe. Dept. MC34. Chippewa Falls. Wisconsin.

"ORIENTAL" Christmas cards. Box 70c. IMMEDIATE Success! Sensational prof-its! Suits \$1.75. Pants 35c, Dresses 20c, Shoes 20c. Operate, from store, home, car Free catalog. Superior. 1250-B Jefferson,

NEW Chemical discovery. Pro Auto Wax, easy way to car beauty. Free sample, in-formation, Amazing profits. Burford Auto Finishes, 1660 20th Street, Santa Monica,

FREE book "505 Odd, Successful Businesses." Work home! Expect something Odd! Pacific-38C, Oceanside, Calif.

Odd: Pacinic-380. Oceanside. Calli.

NEED Money? 450.00 Yours. Sell only
100 boxes New Christmas Cards. Other
100 boxes New Christmas Cards. Other
100 boxes New Christmas Cards.
100 boxes New Christmas Cards.
100 boxes New York City 13.
100 boxes New York City 13.

BUY Wholesale 450,000 Products, Litera-nire Free. Carter. Box 6011-G. Chicago 80.
NATIONALLY advertised appliances, tookware, diamonds, watches, typewriters, tic. Wholesale catalog 50c.—J. J. Davis 50-30 E. Englewood Avenue, Englewood. etc. Wholes Co.. 30 E. I New Jersey.

New Jersey.

FREE Folio "\$45.000. Unlimited Vacations Plan." No canvassing mailorder,
merchandise equipment, Unknown. Works

Garishod, Calif.

MAKE Extra Money. Sell front door
name plates to friends, neighbors. Retail
\$1.98—you make \$1.00! Free selling kit.
Modern Engraving Co., P.O. Box 194.
Boston 14. Mass.

DISTRICT Agency. Chain saws. Wheel mounted. Power mowers. Sales-service. Exclusive. Parmco-PS, Excelsior Springs.

SAVE 50-75% On household appliances. Free particulars. Wholesale catalog. Nueblings-P. Sicklerville, New Jersey. MAKE Money with fast-selling Bost-ta-ian Shirts. Spare time, full time. Sales kit, actual sample fabrics, Free. Bostonian, 89 Bickford. Dept. F-11, Boston 30, Mass.

SALESMEN make big money with Beauty Auto Arm Rest, the new auto ac-cessory, protects arm from hot door sills, top profit for you and merchants. McFali Co., Box 226. Rock Island, Illinois.

CO., Box 226. Rock Island, Illinois.

DIRECT Salesmen—Mail order dealers:
Here's quick profits! Unbelievable sales
being made! Amazine new 'Uclean House's
here's quick profits! Unbelievable sales
being made! Amazine new 'Uclean House's
sales weeks sale—no flame no
to the sales weeks sale—no flame no
to sales weeks sales weeks no
to sales weeks sales weeks
part of the sales weeks
to sales weeks sales weeks
to sales

\$1.00 PROFIT selling \$2.95 photo enlargement offer. Allen Studio, Reigler Bidg., Little Rock, Arkansas.

MAN to earn \$150 up per week. Long Needed invention. Advertised worldwide. Prospects everywhere. Full or part time. Exclusive. No investment. Free use of samples. Write Red Comet, Inc., Dept. 368-M. Littleton, Colorado.

44 HIGH-GRADE SALESMEN

AD Matches: Sell Amazing Designs—30 40 and 240-light book matches.
Bigst and sell-light book matches.
Bigst appropriate the sell-light book matches, a prospect low mess appropriate light between the sell-light between the sell-

ADVERTISING book matches—Cash in on big demand—sell Union label matches Cuts for all businesses and political par-tiles—Free powerhouse selling kit—low prices—protection guaranteed on repeat orders—Cash commissions. Superior Match Co. Dept. P-834. *530 Greenwood. Chicago

EDUCATIONAL &

BOOKKEEPERS! Increase your earnings! Operate your own simplified "Dollar-A-Week" Bookkeeping and Tax Service. Full or spare time. Details Free. No obligation. Ellis, Box 203. Cedar Grove, North Carolina.

USED Correspondence Courses and Books sold and rented. Money back guar-antee. Catalog free. (Courses Bought.) Lee Mountain, Pisgah, Alabama.

COMPLETE Your High School at home in spare time with 57-year-old school. Texts furnished. No classes. Diploma, In-formation booklet free. American School, Dept. XC-46. Drexel at 58th, Chicago 37.

WANT A Diesel Job? New Opportunities to increase income. Higher Pay, More Moncy, We can help you Qualify. Tools. Shop method home training. Write today! Diesel. Tractor. Heavy Equipment Division. Interstate Training Service, Dept. B2-H. Portiand 13. Oregon.

PHYSICAL Therapy and Message. We train you at home. Earn big profits from your own private practice or work with hospitais and doctors. Free catalog. National Institute, Desk 3. 4868'z Sheridan tional Institute, Desk 3, 48 Road, Chicago 40, Illinois.

BE a Reai Estate Broker. Study at home. Write for Free Book today. "G.I. Approved." Weaver School of Reai Estate, 301 Law Bidg. Kansas City. Mo.

HIGH School diploma at home. Licensed teachers. Approved materials. Southern States Academy. Box 144 PX, Station E, Atjanta. Georgia.

INCREDIBLE! Become Mental Super-man Overnight! Free Booklet! Bijou, Box 1727-VO, Hollywood 28, California. Bijou, Box

STUDY by correspondence for Doctor's degree in Psychology, Metaphysics, and Divinity, College of Divine Metaphysics, Dept. P-S 2811 No. Hilmols Street, Indianapolis 8, Indiana

PIANO Tuning Pays. Learn this profitable profession at home easily with patented Tonometer and mechanical aids. No knowledge music necessary. Diploma granted Veteran approved. Write for booklet, Nies Bryant School, 3731 Stocknown of the profit of the pro PRACTICAL Nursing—Learn Easily at Home. Spare Time. Big Demand. good earnings. High School not necessary. Write for free facts. Wayne School, Dept. FH-25. 2525 Sheffleid, Chicago 14. Iii.

BOOKKEEPING—Seif-check course \$9.95. Free Adaptability Test—Write P. D. Lipscomb, 1436 N.W. 26th, Oklahoma City 6. Okla.

WELDING training pays at Hobart Weiding School, Box P-841, Troy, Ohlo, VA Contract, Best equipment, Catalog Free. BECOME a Doctor of Psychology or Metaphysics. Learn secret of contentment. happiness. Win degree of PsD. or MsD. Solve mental worries. Free book. College of Universal Truth. 5038-K Broadway. Chicago.

GOVERNMENT Position; Home training for Examination, \$9.95—Refunded if you don't pass. Write. Ozment Instructions, 37-CS-Box 665, St. Louis, Missouri. BECOME a mentai marvei. Throw away that calendar. Learn to tell the day of the

that calendar. Learn to tell the day of the week for any date, any year—mentaliy! Amaze yourself and your friends! Very little memory required. Easy to follow in-structions \$1.00. Ti-Mental Company, 3449 Tampa, Houston 21, Texas.

SIMPLIFIED method teaches aigebra instantly, \$1; guaranteed, Zlemben, 6123 Orchard, Dearborn, Michigan,

OWN A Collection Agency, pays Franklin Credit, Roanoke 7, Virginia.

MEDICAL Laboratory Technicians in great demand. We train you in your own home. Catalogue free. Imperial Technical Institute. Box 973-B. Austin. Texas. INDIVIDUALIZED instruction in math matic topics—square root, factoring, de-terminants, simultaneous and quadratic equations. Details free Hosea Doxey, 2354 North 8th Street. Milwaukee 6. Wisconsin.

EARN'While You Learn Auto And Diesei Mechanics. Master this top paying trade. Many graduates earn \$100 a week and up. Approved for Korean veterans. For free information write Dept. No. 262. Nash-ville Auto-Diesel College. Nashvilie 3. Tenn.

FREE home study course in basic economics offered as a public service. Recommended by many leaders. Send posteard for complete information. Henry George School, Dept. P. 50 E. 69th Street, New York. 21, New York.

NOTE 21. New York.

AFRAID TO Talk': Lack confidence in the sound of your own voice? Amazing home training pian quickly gives you strong, confident voice. Free booklet gives facts, Write Prefect Voice Institute. 20 South Clinton, Studio 2HW-1, Chicago 6.

"PUGH'S Scientific Wheat Trading geles 5, California.

MEDICAL 1 & Section 1.

MEDICAL Laboratory Technique. Learn at home. Catalog free. Century College, 9 East Ohio, Chicago 11, Iilinois.

LEARN Sewing Machine Repair, Guar-anteed Plan. Assures Success. Write Purdy. Box 207, Weatherford, Texas.

DIPLOMAS, Home-Study, degrees, fold-#102 free, Aurea, 156 West 73 Street, r #102 free. A MIRACLES via Subconscious Controi. Free Autodynamic Brochure. Box 847, Ocean Park, Calif.

EDUCATIONAL books, correspondence ourses, bought, sold, rented, Free Cata-g, Williard Bayles, 211 Essex, Hacken-ick, New Jersey.

ADVANCE Faster! "Speak Effectively."

\$2. Chamberlin Method, Box 251, Mili Vai-

USED Correspondence Courses and Edu-cational Books Bought, Soid, Rented, Cat-alog Free, Educational Exchange, Sum-merville, Ga. RECOGNIZED College Degrees through ome study. Tahoe Colleges. Box 912. home study. Reno. Nevada.

Reno. Nevada.

GROW Mushrooms. Celiar, shed. and outdoors. Spare, full time, year round. We pay \$3.50 b. We paid Babbit \$4.165,00 in few weeks. Free Book. Washington Mushroom Ind., Dept., 180, 2954 Admirai Way. Seattle. Washington.

SEND 50 cents for list, and details, of world famous competitions, enormous prizes, S. Punter, 6 Laval Road, Montreal

SURPRISES Galore!!! Fabuious Home Income Opportunity! Long established con-test hdqtrs. Send stamp! National Contest Builetin. Box 2685-PS, Miami 16. Fiorlda.

DETECTIVES

DETECTIVE Training. Phillips Secret Service System, 1917-C North Kenneth. Chicago 39 Ill.

DETECTIVES—Work home—Travel, Experience unnecessary. Detective Particulars free. Write, Wagoner, P-125 West 86th, New York 24.

INVESTIGATOR Training, Experience unnecessary, Many opportunities, Send for Free particulars, Free credentlais, Ex-change Secret Service System, 4360 Broad-way, Chicago 13, Illinois.

LANGUAGE OUTFITS

TTS Fun tearning a language by Lin-gabbon and the state of the state of the state of speak French. Spanish, German, Russian, Japanese 29 languages by Linguaphone World's Standard Conversational try. Save time work, money, Send for Free Book. Linguaphone Institute. \$408 RCA Building, New York 20

BUSINESS SERVICE. INFORMATION, NAME LISTS

MAILING Lists, most any classification. MAILING LISTS, most any classification, 1000 names \$5.00, 1000 your circulars mailed with ours \$4.00, 5000 your circulars printed and mailed \$12.95. Write Dixie Mailers, King, North Carolina.

TROUBLE getting Capital? Concerned about marketing plans? For tried and proven method enabling effective presentation of your enterprise. obtain "Bast-Pundamentals of New Enterprises". Past-paid \$2. The Rover Research. 650 South Orand. Los Angeles 17. California.

1.000 ADDRESSES on gummed labeis, \$7.00. C. H. Hutchison, 4167 Hemphili, Fort Worth 15, Texas.

SPECIAL SERVICES

PLASTIC iaminating of cards, photos, documents, etc. Up to 2x3"-50c; up to 2x6" or 3x4"-\$1.00; up to 6x8"-\$1.50. Prices for plastic sealing any article. Joseph Lush. Box 59, West Cornwail, Conn.

LETTERS Remailed from N.Y.C. 25c each, 6 postcards \$1.00. Van Buren, 87 N. Main Street, Pearl River, New York.

AUTHORS SERVICE

NO juck finding a book publisher? Write for Free Bookiet PS, Vantage Press, 120 West 31st. New York. BOOK Manuscripts Invited—Co-opera-tive publishers since 1925. Meador Press, 324 Newbury St., Boston, Mass.

HAVE your book published by Nelson-Hali. 210 South Clinton. Chicago 6. (Founded 1909). Free details.

ADVERTISING, AGENCIES, ETC., FOR ADVERTISERS

ADDRESS Advertising Postcards. Must have good h town. Mass.

MAIL order advertisers, use the big ten. 35 million readers, Free Booklet, Diener & Dorskind, 147 West 42nd, New York City. BR9-8300

20-WORD ad free with year subscrip-ion \$1.00—Christian Cltizen, Ann Arbor,

CARTOONING, SIGN PAINTING, CHALK TALKS

"HOW To Make Money With Simple Cartoons"—A book everyone who likes to draw should have. It is tree; no obliga-tion. Simply address Cartoonists' Ex-change. Dept. 198C. Pleasant Hill. Ohio. CARTOONING self taught co-course only \$1.00. Cummings Studie Utah Street, St. Louis 4. Missouri. t. complete Studio. 2009

COMPLETE Drawing Course \$1.00. Richmond Enterprises. Box 1003, Augusta. Georgia.

Georgia.

MAKE Day-Gio daylight-fluorescent signs. No experience needed. Starting kit \$1.00. Edward Cook, 51 Martin, Saratoga Springs. New York.

TYPEWRITERS & OFFICE MACHINES

TYPEWRITERS. Printing Devices. Office Machines, supplies, appliances. Dixle Graph. King. North Carolina. MONEY Protected Protectograph Check-writer. Free Literature. Box 777-F. St. Louis 1. Missouri.

TYPEWRITERS—Govt. surplus. office size typewriters \$23 up. Free list. Meshna. 580A Lynn, Malden. Mass.

PRINTING. MULTIGRAPHING, ETC.

BETTER printing reasonably priced. Samples. Estimates. Write Reporter, Chelsea. Okiahoma. JOB Printing—Letterheads—Envelopes—Circulars. Printing. 21 Barclay. Portsmouth Virginie

Circulars. Pranticular Virginia.

OFFSET printing, \$6.50-1000, 8½x11, ib. National Letters, 1457 Broadway,

New York 36.

ONE Thousand Highgrade—Businessprofessional—Personal—Printed Cardaprofessional—Personal—Printed CardaCardia—Personal—Printed CardaProfessional—Printed CardaSample—Text—with order now. Mayer.
Box 92, Mediord 53, Mass.
FREE samples Air mailed fast printing
service. Postpaid. D & M Sales Co., Sebestopol. California.

BUSINESS, personal printing, Samples free McIlvaine, Box 86-P, Brooklyn 30, New York. PRINTING mimeographing office sup-ies. Free samples. R. Bailey. Monterey

rennessee. CARDS (Business-Personai)—Piateiess Engraving—6 lines—500 cards. card-case—86.00. Jerry Flynn. P.O. Box 247, Fiushing. New York.

ing. New York.

QUALITY Printing. Reasonable prices.
Good service. Free price list. samples.
Southern Printers. Aima. Georgia.
500 STANDARD Letterheads or Envelopes \$5.00 Postpaid. Expert M.O. printers.
Free catalog. Arthur Steinbergen. 1274-L
Stebbins. New York City 59.

PRINTING OUTFITS, SUPPLIES

DO your own printing. Save money, Simple rules. We supply everything, Print engraphy to the printing the engraphy too. Have home shop. Details free Kelsey Presses. V-8. Meriden. Conn. MAKE your own self-modding rubber stamps and printing cuts. Plexirubber. Argyle 2. Wisconsin.
FRINTING Presses. Type Supplies. Lists 5c. Turnbaugh Service. Logsville, Penna.

PATENT ATTORNEYS

C. A. Snow & Co.—S-427. Snow Build-ing. Washington 1, D. C. Registered Pat-ent Attorneys. Write for information.

INVENTORS: Without obligation, write for information explaining the steps you should take to secure a Patent. John Randolph, Registered Patent Attorney of Columbian Bidg. Washington 1. D. C. REGISTERED Patent Attorney offers ervices. Sanders, 6430 Evans, Chicago 37,

INVENTORS: Learn how to protect your invention. Special booklet. "Patent Guide formation concerning interest of the formation concerning interest protection and procedure together with "Record of Invention" form will be promptly forward tion. We are registered to practice before the U.S. Patent Office and prepared to serve you in the handling of your patent serves you in the handling of your patent sacoboon. Registered Patent Attorneys, 42B-G District National Building, Washington, D. C. invention.

ed to you tion. We U.S.

INVENTORS—Send today for booklet "Patent Protection for Inventors" giving detailed patent information and preliminary steps to take toward patent protection, also "Evidence of Invention" form. Victor J. Evans & Co., 941-J Merlin Building. Washington 6. D. C.

Building, Washington 6, D. C.

INVENTORS—If you believe you have
an Invention, we can make a preliminary
search on your invention and advise you
whether we think it can be patented. Send
Protect Your Invention and "Invention
Record" form. No obligation. McMorrow,
Berman & Davidson. Registered Patent
Attorneys, 143-D Victor Building, Washington 1, D. C.

PATENTS—Irving L. McCathran. 316 McLachlen Bidg., Washington 1, D. C. Registered Patent Attorney.

INVENTION Record form free and "Pat-ent Information Every Inventor Should Have". Carl Miller, Registered Patent At-torney, Woolworth Building, New York. "INVENTOR'S Guide" and "Record of Invention" free on request. Frank B. Led-ermann, 154 Nassau Street. New York City.

INVENTORS: When you are satisfied that you have invented something of value write me, without obligation, for information as to what steps you should take to secure a Patent. Write Patrick D Beavers, Registered Patent Atty., 938 Columbian Bidg., Washington I. D. C.

FOR INVENTORS

INVENTORS—Send for free patent in-formation book and inventor's record, Registered Patent Attorney, Associate Examiner, Patent Office 1922-1929; Patent Attorney & Advisor. Navy Department 1930-1947. Gustave Miller, &PSI Warner Building, Washington 4, D. C.

1930-1947. Gustave miner. The Building. Washington 4. D. C.

INVENTORS. If you have an invention for sale, patented or unpatented. write institute of American Inventors. Dept. 30A. 531-E St., N.W., Washington 4. D. C. INVENTIONS Promoted. Patented or Unpatented. Established 1911. Write Adam Fisher Company. 5418 Idaho. St. Louis. Mo.

INVENTORS: Without obligation, write for information explaining the steps you should take to secure a Patent on your invention. John Randoiph, Registered Patent Attorney, 206 Columbian Bidg., Washington 1, D. C.

Washington 1. D. C.
INVENTORS: Learn how to protect your invention. Special booklet. "Patent Guide formation concerning patent protection and procedure together with "Record of Invention" form will be promptly for fore the U. S. Patent Office and propagation. We are registered to practice before the U. S. Patent Office and propage for the process of the patent of

ing. Washington. D. C.

INVENTORS—If you consider your invention to be something of importance, in the properties of the properties of the properties of the properties of the project of

Washington 6. D. C.
INVENTORS—If you believe you have
an invention, we can note a pounting
whether we think it can be patented. Send
of copy of our Patent Booklet. "How to
for copy of our Patent Booklet." Who to
Record." form. No obligation, McMorrow,
Berman & Davidson, Registered Patent
Autorneys, 43-C. Victor Building, Wash-Attorneys, 143-ington 1, D. C.

INVENTION Record form free and "Pat-ent Information Every Inventor Should Have". Carl Miller, Registered Patent At-torney. Woolworth Building, New York.

"INVENTOR'S Guide" and "Record of Invention" free on request, Frank B. Led-ermann, 154 Nassau Street, New York 38, ermann, 1

PATENT Searches, \$5.00, including pat-ent copies. Same reliable search as con-ducted for patent attorneys. Free protec-tion forms, prompt efficient service, Patent Service Institute, 945-B Pennsylvania Ave-nue, Washington 4, D. C.

nue. Washington 4, D. C. SARCHES—Put your patent searches in the hands of a Registered Patent Attorney or Agent as he qualifies to give a lower of the patent and the patent and the patent and interest of the patent patent protection. Patrick D. Beavers, Registered Patent Attorney, 939 Columbian Bidg., Washington 1. D. C.

Columbian Bidg., Washington 1, D. C. CASH For your ideas, 280 Manufactur-ers need inventions, patented or unpat-ented. List free, Invention Bureau, 208-S Clinton, Oak Park, Illinois.

GO Florida Winters—Maine Summers. Sell unpatented invention like I did. In-formation \$1.00. Upson, Brownfield 1, Me. PATENT Searches \$5.00, 48-hour airmail PATENT Searches \$5.00, 48-hour airmail service. Record of Invention forms free. Write Patent Engineering Service 7 il ith Street. N.W.. Washington. 5. D. C. PATENT Searches \$5.00, 48-hour service. Free Record of Invention. Write Raymond L. Smith, Patent Searcher. 622 Sheraton Building. Washington 5, D. C.

outiong. Washington 5, D. C.
PATENT Searches, Including copies of nearest patents, \$5.60. Reports airmailed within 48 hours. More than 75 registered patent attorneys use my service. For Free Invention protection forms, write Miss Ann Hastings. P.O. Box 176. Washington 4, D. C.

61 INVENTIONS WANTED

INVENTIONS wanted. Patented; unpat-ented. Tremendous Manufacturers lists, Globai Marketing Service, 1404 Mitchell. Oakland 1. Calif.

INVENTIONS promoted. Patented or Unpatented. Established 1911. Write Adam Fisher Company. 5418 Idaho, St. Louis, Mo. INVENTORS: If your invention is adaptable to our business we will contract on cash or royalty. If not, we will try to place. Free booklet. Kessler Sales Corporation, 78A, Fremont, Ohio.

INVENTORS Don't sell your invention Patented or Unpatented until you receive our offer write Cowgill, Box 298, Marlon. O.

INVENTORS: Hundreds of manufacturers have requested our assistance in locating marketable new products. Complete information free. Institute of American Inventors, Dept. 30C, 631—E Street, N.W., Washington 4. D. C.

INVENTIONS Wanted. Patented or Pat-ent Pending. 23 years experience Promot-ling Inventions. National Service Bureau, 3122 Meramec, St. Louis 18, Mo.

PATENTED, unpatented inventions. Complete promotion service. Free particu-lars, expert advice and invention recording. Superior, 338-342 North Rodeo. Beverly Hills, Callf.

INVENTIONS Wanted. Patented. Pend-ing only. Inventors Patent Exchange. Hartford 1. Conn.

WE have manufacturing connections, capital. And energy. We need your inventions. Write Inventor's Mart, 628 Esperson Bidg., Houston 2, Texas.

INVENTIONS Wanted. Patented, unpat-ented. Send for free form "R," Gilbert Adamec. Patent Broker. 3 Park Row. N.Y.

PATENTS FOR SALE GARAGE door seal-wood, metal, patent pending. Fred Beck, Gallitzin, Penna.

64 MODELS, MODEL SUPPLIES

SHIP and other scale models. Most complete line in New England. Kits. fittings. plans. books. tools. engines. motors. Illustrated catalog 25c. James Bliss & Co., Inc.. Dept. PS54. 342 Atlantic Ave., Boston 10. Mass.

ton 10. Mass.

SHIP and yacht model fittings; blue-prints. Send 35c for illustrated catalog =29 listing hundreds of items. A. J. Flsher. 1002-2 Etowah Ave., Royai Oak.

1954 CAR models. 1/25 scale, ali metai, chrome trim. Send for catalog. Cars & Hobbles. Dept. PS-20, 2333 Haddon, Chicago.

SEND END 10c lllustrated railroad catalog; and O. Selley, 746 Clay, Winter Park. GEARS and model Supplies for the inventors. Send 10c for catalog. Pierce Model Works, Tinley Park, Illinois.

FLEISCHMAN famous German Steam-Engines \$5.95 to \$85.00 & mechanical ships 79c to \$45.00 postpaid. Catalog 35c. Merlo Company, 50-18 94 Street, Elm-hurst 73, New York.

POCKET size lubricator, 1001 uses, leak-roof, perfect for precision oiling, \$1.00 pd. Wey Brothers, Quanah, Texas.

STEAM engines, boilers, castings, Catalog 25c. Anton Bohaboy, 2297 Price, Rahway, N. J.

SHIP Models Ltd. Kits. Fittings, Plans. Stuart-Turner Steam Engine Castings, 1954 Catalog 25c. Box 225, Andover, Mass. HOME CRAFTSMAN

"TOPS" in everything for Leathercraft, Lowest prices. Genuine "Craftool" stamps. Catalog 10c. Crown Leather Company, 22 Spruce Street, New York 38.

LEATHER, tools, lacing, supplies, Free Catalog, National Handloraft, 199 William St., New York 7.

"PRACTICAL Painting, Wood Finishing" shows how to get professional results. Furniture finishing, workshop projects, home decorating, Complete Modern brush and spray methods. Tricks you've never seen. Write Home Craftsman.

FLASTICS home-craft course for Men and Women. Tells and shows how to make the man women. Tells and shows how to make All plastics and materials for 32 projects included in course. No special tools needed. Course pays for itself. Write for Free booklet, interstate Training Service, Dept. D2-M. Portland 13. Oreson.

LEATHERCRAFT. Tremendous stock of leather tools, supplies and kits. In leather business over forty years. Send 10c for blg catalog. Sax Bros. 1111 No. 3rd. Dept. PS8. Milwaukee 3, Wisconsin.

LEATHERCRAFT, Metal Tooling, Tex-tile Painting, Beadcraft, Shellcraft, many other crafts. Fun, easy, profitable! Free big, illustrated catalog, Write today, Kit Kraft, Dept. 358, Hollywood 46, Calif.

FREE "Do-It-Yourself" Leathercraft Catalog. Tandy Leather Company. Box 791-B5, Fort Worth, Texas.

791-95. Fort Worth, Texas.

FREE! LeatherKraft Catalog Free!
Write Box 397B (Use Little 2c posteard)
Tandy Leather, Tailsa. Oktahoma.

LEATHERCRAFT of Highest Quality
On Advanced Robbyrus, Frolessionals and
Leather Group Complete Stock of
uniform selection of tooling and carving
leathers. fine calfskins, kits and projects.
Quality Guaranteed. Complete stock of
using the One source for All your leathercraft requirements. All orders shipped
same day received. Send for Today for
J. C. Larson Co. 250 S. Tripp. Dept. 4354.
Chicago 24. Chicago 24.

101 FULL size patterns. Smart new gifts. novelties. lawn figures, shelves. ac-tion windmills. alphabets. Plus "Make Money Jig Sawing" Only \$1.00. Master-craft, 85S, 7041 Olcott, Chicago 31, Illinois.

craft, 885, 1941 Oriout, Officiago 31, 11111100.

129 NEW full size Jigsaw Patterns, Unusual novelties, gifts, lawn figures up to 22 inches high, action (merry-go-round) windmill. tovs, useful gadgets, Artist drawn, \$1 Craftplans, 1321-B South Michigan, Chicago 5.

Michigan, Chicago 5.

SENSATIONAL new stroke sander kit.

24 page instruction, assembly book with
talle—140.0 Allon Engineering, Box 101.

Denville 2. New Jensey.

STYLEGRAPT sure fire hills. "Pretneed"
STYLEGRAPT sure fire hills. "Pretneed"
Belts, over fifty other projects. Patterns on
teather. Why trace? Just carve, assemble
kits also available. Send 25c for catalog,
free folder. Refunded first order. Apacte
Leather Company, 2804 E. Washington St.

FREE: 24 page. Conput. prass. mater.

FREE: 24 page. Conput. prass. mater.

FREE: 24 page, Copper, brass materi-is catalogue, Groundmaster Company, Boulder, Colorado.

BUY wholesale nationally advertised power, hand tools, thousands other prod-ucts at big discounts. Free "Wholesale Plan," American Buyers', 630-SS Linden Buffalo 16, New York.

FORMICA Remnants make coffee & end tables, sheives, cabinet tops. Samples & price iist 56c. Modern Woodcraft, 952 Broadway. Bayonne, New Jersey.

LAMP Size cypress knee, nipple instailed \$2.00. Cy Products, Dept. 3M. Lafayette, La. NOVELTY planters for pleasure, profits. Six patterns, instructions 30c. P. Brown, 53 Hawthorne. Norwood, Mass.

KNOCKDOWN Cedar Chest, Lumber and Veneers, Free Price List, Giles Co., Brownsboro, Aiabama.

KNOCKDOWN cedar chest and iumber free price list. Bedford Lumber Company, Sheibyvilie, Tennessee.

LEATHERCRAFT Tools, Leather Em-bossing Plates. Craft Accessories, Dies. Catalogue 10c. Louis Jones Engineering Company. 1613 Main. Fort Worth, Texas. EQUAREKNOTTERS: Make beits, hand-bags, ianyards, dog leashes, etc. Special offer! Beginner's book, catalog and quality cord samples 15c. P. C. Herwig Co. Dept. P41, 39 Henry St., Brooklyn 1, New York. EXOTIC Veneers for home craftsmen. "Veneering Tips", price list free. Veneers, Box 1644-A. Louisville. Kentucky.

BUILD IT VOURSELF

INFLATE balloons with ighter-than-air gas. Enjoy fascinating new hobby and ungaster than the state of the sta PROFIT from nature plans \$1. Naco, -6, Box 357, Pensacoia, Fiorida.

GEIGER Counter and Metai Detector Kits. Inexpensive Educational Free Lit-erature. Electronic Applications, Box 4975, Washington 8, D. C.

\$1.00 PIPE vise, send for information. H. A. Johnson, P.O. Box 62, Fruitvaie Station, Oakiand, California.

"CONCRETE Block Homes." 32-page bookiet on how to build. \$1.00. H. C. Lightfoot. Civil Engineer, Richboro. Pa. ELECTRIC drili powers sixteen inch ro-tary mower. Kit includes spindies. bear-ings, puifeys. biade, flanges, plans, in-structions, 316.45 postpaid, Farwest Fabri-cators, Box 495 Brynmawr, Seattle 88.

Washington Washington.

MACHINIST Tooi and Diemakers —
make your own Patented Vise Jockey.
Complete 4 drawings \$2.00, enclose self
addressed iabei. Vise Jockey, 361 - 91st
Street, Brookiyn 9, New York.

BUILD permanent awnings, patios, fa-lousie porch, bathtub and shower enclo-sures. Auminum prefabricated frames. Assembie yourself and save. Close-out prices. Russ Smith, 1555 Ridgewood, Cleveland 7, Ohlo.

DRIFTWOOD Lamp Kits, complete with driftwood brass tubing, wiring, fixtures, \$5.95. No COD, Driftwood, Box 2361, Ken-more 23, New York.

POWER Mower Kits, free pians, instructions, parts list. Temco Mowers, Springfield 2. Missouri.

CLEVENGER'S coid bending ornamental railing, furniture instructions \$2.00. Weld or rivet. Box 1001. Santa Rosa. California. AIR Conditioners—Home or Automobile. See Seeley ad, page 54.

CUSTOM desks, table tops, Wrought Iron Legs any length, factory prices, Hapco Mig. 3124 Westward Bivd., Phoe-nix, Arizona.

WHOLESALE plumbing heating sup-plies, free catalog. Aim, 316 South St., Philadelphia 47, Pa.

RANCH House. 3 bed rooms. Architec-rally designed. Plans and specifications. .00. Roth Tech., Box 2283-F, Youngs-wn. Ohio.

50 TOY Pians 50c. "Original Idea." Easily built using household items. M. Mascorro. 1039 Waverly. San Antonio. Texas. BAROMETERS, build own—free infor-mation. Abtek, 1075 Third Avenue, New York 21.

OLD GOLD, JEWELRY, WATCHES, ETC.

JEWELRY making. Send 20c for illustrated catalog. Milady-Fair Co., G.P.O. 1328. New York City 1.

RHINESTONES, Jewelry Settings, Cam-eos Sequins Beads, Hobby Kits, Send 10c for Hiustrated Catalog, J & M Noveities, Dept. CJ-4, Griffith, Indiana.

Dept. 0.7-4. Griffith, Indiana.
FREE Sample pair of Earnings shows you how easy it is to make beautiful convergence of the conv

HIGHEST Cash For Old Gold, Broken Jeweiry, Gold Teeth, Watches, Diamonds, Silverware, Spectacles, Platinum, Free in-formation, Satisfaction Guaranteed, Rose Refiners, Heyworth Bldg., Chicago 2.

10 SWISS watches \$18.00. cataiog 10c. Berkowitz, 1150 Castiehiii, New York 62. COSTUME Jeweiry—Findings. Stones— Rhudium and Hamiiton piating. Roal Sup-ply. 856 South Orange Avenue. Newark. ply. 856 So New Jersey.

TOBACCO & PIPES

PIPE Smokers! Cigar Smokers! Free in-lustrated catalog offers fabulous savings on choice imported and domestic pipes, cigars. tobaccos, supplies. Write Waily Frank, Dept. 2, 150 Nassau Street, New York 38, N. Y.

FOR THE HOME

CLEAN your coai furnace with hinged radiator rake, \$2.00 postpaid, Midwest Products, Box 223, Pocateiio, Idaho. GUARANTEED formula cleans cesspools—septic tanks. Details free. Reyco Box 666. Council Biuffs. Iowa.

NEW!! Electronic Brain, automatically NEW!! Electronic Brain, automatically defrosts refrigerators, turns off and on televisions, radios, toasters, house lights, etc. Anytime of the night or day—\$9.95—free information. Williams Electronics, Inc., Box 488, Dept. 2C, Newark 1, N, J, CESCHOOLS

Inc. Box 488, Dept. 20, Newark 1, N. J.
CESSPOOLS. septite tanks, outdoor
toliets cleaned, doodorized. No pumping,
Details. Chemicai Cesspool Cleaning Co,
Boston 34, Mass.
FAMOUS coiored art reproductions.
Bargains. Free list. Horizon, 339 38th
Street, Paterson, New 2irrest;

FOAM rubber furniture cushions—Fac-tory seconds 50% discount. Free catalog. Pe.ma-Foam. 140-A Main Street. East Orange. New Jersey.

OF INTEREST TO WOMEN

ADDRESS Advertising Postcards. Museus good handwriting. Box Nine, Water

town, Mass.

EMBROJIDER Stamped Linens. Buy direct from manufacturer and save. Send or Free catalog. Merribee. Dept. 598, 22 West 21st Street. New York 10, N. Y. NEW Piastic Mending Tape. Just press n! Repairs ciothing instantly. Lightning iter. Samples sent on trial. Kristee 103, Akron. Ohio

MAKE money addressing envelopes paretime. Gienway, 5713 Euclid, Cleve-

MAKE money addressing envelopes sparetime. Gienway, 5713 Euclid, Cleveland 3, Ohlo.

DRESSES, 24c: shoes 39c: men's suits, \$4.95; trousers, \$1.20. Better used clothing. Free Cat. Transworld, 164-AF Christopher, Brooklyn 12. New York.

NEW startling Sesame System, strange numerological device predicts coming events with amazing accuracy. Analyses character. Mystery sticks emerge at your command with winning numbers sports events. Fascinating, uncanny! Keys. Box 852. Portland 8. Oregon. \$2.30 postpaid. A Dress-lingerie shop in your home. No investment, Good commissions. Write for Sampie Book. Modern Manner, 260-PC Fifth Avenue, New York

HOME Business opportunity maliing literature to new mothers. Everything furnished. Big earnings. Kit-instructions. \$1.00. Stanwiii Company. Fostoria 34. Ohio. GROW Mushrooms. Celiar, shed, and outdoors. Spare fuil time, year round. We pay \$3.50 ib. We paid Babbitt \$4.165.00 in few weeks. Free Book. Washington Mush-room Ind., Dept. 181. 2954 Admirai Way, Seattie. Washington.

71 FOR SALE MISCELLANEOUS

CHILD'S handbag, compact, lipstick, comb—\$1.00; Play moneykit—50c, Prepaid. Rite's, Box 3409, Long Beach, Calif.

CATALOG on government surplus from country's largest surplus organization spontry largest surplus organization spontry in the surplus of the

72 WANTED MISCELLANEOUS

SCRAP Mercury (Quicksilver) containers supplied. Tantaium—Bismuth—Tungsten. Metailurgical Products Co.—Established 1999, 35th & Moore Streets. Philadelphia 45. Pa.

LIGHT meter, Commander, wanted Manufactured by Kemp-Eisenberg, B. Paui, Reeves Instrument Corp., 215 E. 91st, New York 28.

QUICKSILVER. Piatinum. Siiver. Dia-monds. Prompt Payment. Mercury Termi-nai. Norwood. Massachusetts.

WEARING APPAREL

TIES, matching links, \$3.00 set. Prepaid. Solids. patterns; state color. Rite's. Box 3409. Long Beach, California.

WORK ciothes below whoiesale cost. Quality cotton pants 89c, shirts 79c, coveralls \$1.69 and shop coats \$1.59. Aid clothes reconditioned, sterilized. We will ship anywhere. COD. Write Eastern Processing Co., Box C, Franklin Station, Baltimore 23, Md.

INTRODUCTORY Offer: Boxer Shorts. sizes 46 to 60. \$1.00. Illustrated furnishings clothing, work-clothes catalog included, Sig Kiein's Fat Men's Shop, 50-E Third Avenue. New York 3. New York.

TATTOOING SUPPLIES

TATTOOING Course and Supply Bro-hures. 25c. Zeis School, 728 Lesiey. chures. 25c. Zei Rockford, Iiiinois.

TREASURE FINDERS

TREASURE Hunters! New 11-pound featherweight Model 101 locator for gold. silver and minerais. Money-back guarantee best available. Also Geiger Counters for uranium prospectors. Complete information free. The Goldak Company, 1540 W. Glenoaks Blvd. Glendafe 1, Calif.

GOLD Silver, Metal Detectors, Geiger Counters for Uranium, Mineralights, Sen-sational new fully guaranteed models, None Finer, Information Free, Detectron Corp., 5420 Vineland Ave., North Holly-wood, California.

SELECTIVE metai and mineral detector. Revolutionary design. Distinguishes metais from black magnetic sands. Readily detects metais under sait water. Also Geliger Counters. Free literature. Gardiner Electronics Company, 2018 N. Dayton. Phoenix. Arizona.

URANIUM, Gold, Siiver, Treasure. New Power-packed, highly sensitive, metal de-tectors and Geiger Counters. Kit. and fac-tory assembled models from \$34.50. Light-est weight, guaranteed. Free Literature. Electronic Applications, Box 4975, Wash-ington 8, D. C.

TREASURE—M. Scope Geiger Country
TREASURE—M. Scope Geiger Country
TREASURE—M. Scope Geiger
TREASURE
TREASURE—M. Scope Geiger
TREASURE
TREASURE—M.

WATCH REPAIRING

WATCH and clock repairing books for hobbylsts. Free information. North Ameri-can, Dept. 24-H. 2330 N. Milwaukee, Chi-cago 47. Ililnois.

WATCH Repairing—Modernized Correspondence Course. Free information.
WatcHealing Institute. Box 34715-B. Los Angeles 34.

ATCHMAKERS' Tools. Materials. ilies. Watches. Catalog. Gaies. Box Chicago 90, Illinois. WATCHMAKERS' WATCHMAKERS! Beginners! Watches. Movements. Descriptive list. Box 150. Chicago 90. Iliinois.

MISCELLANEOUS

ADDRESS Advertising Postcards. Must ave good handwriting. Box Nine, Waterhave good he

LIST your name in "Big Mails." Get many offers. 25c Cash Refundable. Waiter Rix, Box 6521-B, Cieveland 1, Ohio.

BUY Wholesale! 30-80% Discounts! Freel Large Catalog of Nationally advertised appliances, gifts, watches, jewelry cameras, typewriters, tools, kitcherware, mail order business without capitall Wholesale starting kits furnished. No experience necessary, Outline of unique automatic sales plan included. Consolidated Distributors, Division 125, Box 1537, Paters. ton 15

GET the Opportunity Packet for the latest and best money-making offers in mailorder. Everything for 25c. Redmon. Capitol Heights 2. Maryland.

SWAP unwanted articles for useful ones SWAP unwanted articles for useful ones. Send your name, address and names of articles you wish to swap plus \$1.00 for list of articles and people wanting to swap. Your name added to list free. Tradex, Box 626, Jacksboro Texas.

BUY Wholesale thousands nationally advertised products at big discount. Free "Wholesale Plen." American Buyers', 631-E Linden. Buffalo. New York.

RECEIVE Magazines, samples, cata-logues, Malls from everywhere. Offers. hundreds. Get listed 25c. Rorick. Box 86-M. Cincinnati 26, Ohio.

BIG interesting mails three months 25c ear \$1.00. Harvey Teeple, Decatur, Ind year \$1.00. MAILORDER directory of mailing list ources for \$3.00. Huber Enterprises. 183 arris Place. Spartanburg. So. Carolina. 1001 HOURS of Fun, 25c. Games, tricks, uzzles, Sanford Sales Co., 170 Broadway, ew York 38, New York.

EYEGLASS fogging prevented perma-ently. One wipe with amazing chemical oth. Free details. LoPrestu, RD2. Wharcloth. ton. New Jersey.

SEPTIC tanks. outdoor toilets reconditioned, deodorized without digging, pumping. Easy guaranteed. do-it-yourself method Free. Write Granite State Industries. Box 507E. Manchester, N. H.

GROW Mushrooms. Cellar. Shed. and outdoors. Spare, full time year round. We pay \$3.50 bl. We paid Babbitt \$4.165.00 in Iew weeks. Free Book. Washington Mushroom Ind., Dept., 182, 2954 Admiral Way, Seattle, Washington.

PERSONAL

DETECTIVE'S Opportunities. Detective particulars free. Write. Wagoner. P-125 West 86th, New York 24.

"HOW Can I Find Out?" You Can! Information confidentially developed. Any matter, person, problem. World-wide. Officially licensed. Established 1922. William Herman. 170 Broadway. New York.

RUPTURED? Something different. Light. Cool. No leg straps. No elastic. No pressure on hips or spine. Inexpensive. Worn by Mechanics. Farmers. Doctors. etc., everywhere. Guaranteed. Write Hand-Lock Products. Dept. P.S., Preston, Ont. Canada. Established 1893.

INCREDIBLE! Become Mental Super-an Overnigh! Free Booklet! Bijou, Box man Overnigh | Free Booklet | Bijou 1727-VO. Hollywood 28, California.

ADDRESS Advertising Postcards. Must ave good handwriting. Box Nine, Water-wn, Mass. town

FOOL your friends, 6 postcards mailed \$1.00. Letters remailed 25c from beautiful Newport, Rhode Island. H. M. Dorey Mail-ing Service. 12 Arnold Ave., Newport, ing Service. Rhode Island.

Hopeless? New fer. Write Pixacol. PSORIASIS Victims: Ho Discovery! Free Trial offer. V Box 3583-S. Cleveland. Ohio.

HAND Gulde. Corrects your Penmanship in 10 hours. Write Perfect Penmanship, Box 665-35P. St. Louis. Missouri. Box 665-35P. St. Louis. Missourl.

SAN Diego. California. Letter remailed
2c. 5 beautiful postais \$1.00 remailed
free. Sunday classifieds airmailed \$1.00
month. Advertisement replies received,
forwarded. \$20.00 month. Projects performed for non-resident California propfield \$1.00 remailed. Street.

Confidential Services.

formed for non-resident California prop-erty owners, etc. Confidential Services, 1447 IB Street. 'I.Q.''? If you read Eng-shi you can now take an excellent, recon-nized general intelligence test for adults in your own home. Very low cost! For free information, write: University Test Bu-reau. C. Dozell. Fauc Alto. California.

FLORIDA. Jacksonville — Letters re-malled 25c. Beach postcards 5—\$1.00. R. Henry, 2257 Riverside, Apt. #3.

BACKACHE? Try these simple exercises at home for relief. Send \$1.00 to O.C. Company. P.O. Box 17, North Station, White Plains. New York.

White Piains. New York.
"INTERFSTING Mails"—25c keeps your
mail box full three months. Bentz Desk-J.97, Chatawa, Mississippl.
"X-RAY Mind." Dangerous power over
others. (Details—10c), Krishnar Institute,
Box 812-86. Escondido, Calif.

INVESTIGATOR Training. Experience unnecessary. Many opportunities. Send for Pree particul...s. Free credentials. Ex-change Secret Service System, 4360 Broadway. Chicago 13. Illinois.

BUY vitamins direct. Amazing savings. atalog free. Matoska. White Bear Lake.

GERMAN Address lists! Anything manu-factured 50c. Burke Associates, Manches-ter 2. Mass.

ter 2. Mass.

NEW False Plate for Old in 24 hours!

Low as only \$15.05! Enloy comfortable,
attractive false teeth. Made of Justrous

Dupont Beauty-Pink Plastle. Amazing

Savings. Pree Details. West Dentai Laboratory. Dept. 500. 127 N, Dearborn. Chi-Savings. Free L atory. Dept. 50 cago 2. Illinois.

SFND Postcards from Seattle. We will send you five high-grade cards showing scenes in Seattle. You address and write message, return to us and we mail. We pay all postage-guarantee satisfaction. Send \$1.00—Crosbey Mailing Service. 10601 Ma-rine View Drive. Seattle 66, Washington.

LETTERS remailed in Oregon 25c. Hobby Shop, Box 418, Willamina, Oregon. JOIN Money-Getters Club. 25c. R. Storm Associates. Cedarville. New Jersey. MEXICAN Law. General Practice Attor-ney, 1203 Arizona Street, El Paso, Texas.

LETTERS Remailed from any City in ne United States or Canada. one—25c, ve—\$1.00, state city and mailing date de-ired. Antoci. Box 25, Rothbury. Michigan. slred. CHRIST returned, 70 A.D. Free litera-ture, Truth, 21 Lexington, Phoenix, Ariz,

ATTIC FAN ONLY



Easy to assemble. Belt-driven. Blade, shaft, 2 self-aligning hearings, 2 pulleys, 2 collars, and V-belt, Everything you need, except frame and ½-hp, motor, to make

\$9.95

frame and ½-lp, mour, to many your own house cooler. Send for complete list of fan parts. 5AVE 546.00 PENNA WHOLESALE DISTRIBUTORS 102 N. 6th St., Phila. 6, Pa. Gos Pistols Also Available

See the Greatest Show on Earth with this



belt verde routy for use that 5.8.7.3.

mid 1001 mover individuity mounted and 1001 mover individuity mounted with the plant of the pla

SUFFOLK SCIENCE SERVICE
DEPT, ATP-8 MATTITUCK, N.

ASSEMBLE YOUR OWN DIVING

Double Tank Rig....\$49.95

Absolutely nothing else to buy! We furnish the parts plus complete instructions showing tested optional changes you can easily make. Outfits include Mask, liarness, llose, Tank (or Tanks) Regulator and Fittings.

Catalog! Underwater swimming

Write for descriptive literature today! EDW. AGUADO TRDG. CO., Dept. M4, P.O. Box 4525 Plaza Station, St. Louis, Mo.

BENJAMIN SUPER CO2GAS CARBINE-\$16.50 FCONOMICAL

NEWEST TARGET IDEAL RIFLE - 22 SMALL GAME Cal Benjamin CO₂

SAFE-NON-TOXIC PRACTICAL. Easy to operate - No spring coil - No pumping. Uses low cost Soda Cartridges Il. 22 Benjamin H-C Pellets and Darts.

Vibrasage

WRITE FOR FREE ILLUSTRATED FOLOER OF ALL MODELS
BENJAMIN AIR RIFLES AND BENJAMIN AIR PISTOLS
BENJAMIN AIR RIFLES CO. MARION ST., ST. LOUIS 4, MO. U.S.A.

USEA Vibrosaqe, d ELECTRIC MASSAGER

 Professional-Type • 4 Scientifically Designed

Applicators Sanitary

A few minutes daily use of VIBROSAGE gives that stimulating, healthful aid ta circulation . . . relief from oches ond pains. Faur applicators 01-

sure maximum effectiveness for scalp, face and body. Operates an 110 valt. 60 cycle A.C. Five day trial-

-maney-back guaranteel If your deoler cannot supply you, send \$8.50 check ar maney order, far prepaid shipment. Or, send \$2; pay postman bolonce plus postage and C.O.D. charges.

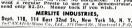
BEAUTY APPLIANCE CORP., Dept. V534-H RACINE, WIS.



ything You Need to Make Big Mone ith New "Midget Miracle" PRESTO Over 2 MILLION Already Sold!

Over 2 MilliON Aiready Soldi
FIRE—everything von need to eash in on this
mazing new kind of fire extinguisher. Tiny
Threato' (about the size of a
tinguishers that cost 4 times as
much and are 8 times as heavy,
Eads fire fast as 2 seconds, Flist
Guaranteed for 20 years! A tremendous money-making bargain—sells
for only \$3.38 A MONTH

for only \$3.88! On this offer you set complete the second of the second



OVER \$1,000



Advertised

in LIFE

Magazini

WITE-WALL LIVE RUBBER DISCS

Permanently cemented to three giving smart Mid-Century look, Idea sweeping Auto industry. Sample Kit to car dealers and Distributors. 20 discs special cenner, roller, 85:5,00, Public 4 discs roller, cement 89:95. Easy to apply. Some franchises open in various parts of the world, Send check or parts of the world. Send check or parts of the world. Send check or many control of the control of the world. AMERICAN WITE WALL RUBBER DISC CO.



A-12 DEMAND OXYGEN REGULATOR



USED GOVERNMENT SURPLUS Terms check or 50 % deposit and balance C.O.D.

M. A. NORDEN SUPPLY COMPANY 273 N. Washington Ave.

BE FREE FROM TRUSS SLAVERY

NOW there is a new modern Non-Surgical treatment that permanently corrects rupture. These Non-Sur-gical treatments are so certain, that a Lifetime Certi-ficate of Assurance is given. Write today for our New FREE Book that gives facts that may save you painful and expensive surgery, and tells how non-surgically you may again work, live, play and love and enjoy life in the manner you desire. There is no obligation. Excelsior Hernia Clinic Dept. 3705

Excelsior Hernia Clinic Dept. 3705

Excelsior Springs, Mo.

BUILD YOUR OWN

AIR CONDITIONERS AND DEHUMIDIFIERS-FOR HOME OR AUTOMOBILE

FROM JUNKED REFRIGERATORS—FOR MITCHONE TRANSPORT TO THE METERS OF THE ME

SEELEY PRODUCTS CO., Dept. 618, 3716 Belment, Chicago 18, III.

PLANES BOATS CARS

LICENSE FREE BAND OPERATES SAME AS \$50.00 SETS INCLUDES LONG RANGE



SPECIAL "SUPPLY SOURCE DIRECTORY" & \$7.00 \$1.00

NOVELTY MART, in circles, Write for FREE Novelty Catalogue, 59 E. 8th Street, New York 3, N.Y., Dept. 279



MFG. CO. P.O. Box 246- 38



DRIVER'S AID . . . the LOOK-OUT At last PERFECT side and rear vision! The Look of the last perfect per THE BO-DIX CO.

7119 CLYDE AV. CHICAGO 49, ILL

00.95 MIND!

Learn Short-Cut Mathematics number tricks. Mai ligatuing-quick min s without using of morts bound volum

Sharpen up Your Brain Power

NELSON-HALL CO., 218 S, Clinton St. Dept. 2HW-1 Chicago 6. III.

\$2.95 EACH OR 2 FOR \$5.00!

Genuine Telephone Company Upright Telephone complete with cords, in tested and telephone complete with cords, in tested wire, roll of tape, inter-communication in-structions. Tape and wire offer for this month only. Complete line of telephones, dial, magneto, inter-communication etc. Write for free list. All shipments F.O.B.

TELEPHONE ENGINEERING CO. Dept. 8A4 Simpson, Pa.

GIANT 100 POWER DAY & NIGHT



Steel and brass tubing construction. Ready to use. Two eyepieces. Instruc-tions for use as a helioscope. Extra heavy tripod. \$7.00 fob factory.

400X telescope makers lens kit has brass focusing tube, erector, 5 lenses and instructions. \$3.00 postpaid.

CARL W. JAMER, Dept. S5, MANORVILLE, N.Y.

SLINGSHOT SUPER SILENT - RIFLE FAST - POWERFUL - ACCURATE Great for small game and target shooting! 15 pound pull. Big, sturdy stock. Lively, raw rubber. Sweet shooting, Free: 50 steel balls (.25 callbre), extrapher and target, Sent by return mail. Guaranteed. Approved by American Small Game Slinghoth Association. SOCK-O. Box 111, So. San Gabriel, Calif.



· Assemble your own boat
No experience • Save 1/2 to 2/3 "fac-tory built" prices • Prices include

freight and paint necessary 8' to 14' Models from \$39.25 Trailers, Fiberglas, Marine Hardware

UGER INDUSTRIES MINNEAPOLIS & MINN

This is it! AMAZING **FOUNTAIN BRUSH** washes your car in 9 minutes!

SAVE \$3.00 Direct ~ from Factory to you!

ONLY

24 EXTRA COST CAR WASHES

Generous supply of powerful, yet gentle AEROMAT detergent, manufactured by makers of famed CN dislifectants— GIVEN! Removes road film. Never mars finish, never streaks! Package holds enough for 24 car washes—saves you 824 or more in washes

- **Built-in Suds Chamber**
- Soft-as-Silk Bristles
- 3-Ft. Handle Keeps You Dry
- **Rubber Bumper Protects Car**
- Rotary Hi-Pressure Action!

Thousands sold at much higher prices! Get yours now BIRETERON-FACTURE and AEROMAT WASHER to your garden hose. Place special detergent in built-in Suds Chamber, and wash our sparkling clean in handle keeps you free & clear. RUTARY HINDRESSURE action loosens, removes all post around film & dirt. Also does dozens of jobs around the work of the control postage by sending check, cash or in.o. with order. Satisfaction guaranted or money back after 5-Day Trial. (Please add 22c postage west of Miss.) Send TODAY! It's a terrific value!

MOTO-MATIC CO.

Dept. 7-H-444, 352 Fourth Ave., Naw York 10, N. Y. (in Canada, pis. add 1.00 extra. Order direct from Thoresen Co. Dept. 7-H-444, 45 St. James St. W. Montreal I, P.Q.) 3-F00T

"TINY ATOM" ELECTRIC MOTORS POWERFUL - COMPACT - PRACTICAL



Wilson's dry-cell operated motors are "tops"—In design, sturdy construction, electrical characteristics struction, electrical characteristics model builders, experimenters, moder fullraders and in industry. GUARANTER. West of the construction of

extended shaft. Permanent Alnico-V magnet field, wound rotor. Heavy duty transparent plastic case. For voltage proc \$2.40. For higher voltage proc \$2.40. For higher Notes of the process of the process

Remit with order and we pay postage in U.S.A. No C.O.D. Add 3% Sales Tax for delivery in Ohio. Write Dept. PS. For quick delivery see your local dealer or order direct

WILSON'S OF CLEVELAND 425 Lakeside Ave., N.W. • Cleveland 13, Ohia

NEW POCKET AMAZING RADIO NEW SIZE RADIO

s-Small as a Pack of Cigarettes!

FITS IN ANY POCKET OR PURSE—GETS

LOCAL RADIO STATIONS WITH CLEAR BELL-



LIKE TONE -NO STATIC OR INTERPETENCE NEEDS NO TUBES, BATTERIES OR COMPLICATED HOOKUPSI NO AC PLUG INSI NOTHER PROPERTY OF STATES OF STAT ANIIME. SEND UNLY \$1.00 (bllf. ck., mo.) and pay postman \$3.99 (C.O.D. postage or send \$4.99 for p.p. delivery. COMPLETE READY TO LISTEN. MIDWAY CO. Dept. PPS-8 Kearney. Nebr.

QUALITY BOAT KITS F. O. B. DEFIANCE, OHIO

WRITE FOR FREE LITERATURE

PENNEY WOODCRAFT INDUSTRIES

1301-09 Ottawa Ave., Dept. 8-P Defiance, Ohio

Shrinks Hemorrhoids Without Surgery

Science Finds Healing Substance That Relieves Pain-Shrinks Hemorrhoids

Science has found a healing substance that shrinks hemorrhoids, stops pain promptly, ends bleeding - without surgery. Doctors report actual shrinking of hemorrhoids. Sufferers say, "Hemorrhoids have ceased to be a problem." The secret is Bio-Dyne® — already widely used for healing injured tissue. This substance is now available in a hemorrhoid ointment called Preparation H*. Ask your druggist for Preparation H. Money back guarantee. *Trade Mark



NOME AVAILABLE FOR THE FIRST TIME pairs are without production of the following pairs are without production of the following pairs are without production of the famous Sparling School of Deep Sea Divine, Only St. DIVINE GUIDMENT CATALOGO—U.S. Explaint, Japanese, French Polymon, Control of the Compression, underwater welding & cutting, care and maintenance compression, underwater welding & cutting, care and maintenance of compression, underwater welding & cutting, care and maintenance of compression, and a sureful of Program Section for kids, only of the compression, and compression of the compr



ACCESSORIES, TOO. QUALITY proved by MILLIONS OF MILES. Sold on MONEY-BACK GUARANTEE. SHIPPED ALL OVER THE WORLD. Write for folders and prices.

MILLER COACH CO. P. 0. BOX PS 218
IRVING, TEXAS

NEW "MAKE-IT-YOURSELF" Furniture Book

* Saves You BIG Money!

with "How To Build and Repair Your Own Furniture" you'll be able to make sturdy, handsome furniture for every room in your home, at a fraction of what you'd pay in stores! You get 256 pages, 759 illustrations, 163 easy-to-do plans!

You Don't Have to Be an Expert!

Step-by-step directions, hundreds of simplified plans and photos take the guesswork out of every job and show you how to turn out professional-looking furni-ture—on your first try! You'll learn how to make or repair tables, chairs, bookcases, desks, bedroom sets, built-in cabinets, shelves, two-way lamps, much more! PLUS useful tips on mirrors, glass table tops, kitchen appliances, picture frames, rugs, etc.

7-Day Free Trial!

Order your copy of this home owner's "dream book" now for 7 days' FREE trial! On delivery pay postman only \$2.49 plus postage—then use it for a whole week at our risk. If not delighted return for full refund!

POPULAR SCIENCE, Dept. 854
N. Y. 10, N. Y. 353 Fourth Ave.

ed fan. Rocky Mountain e C.O.D. plus shipping. Pay full amount; save shipping costs. Supply limited — ACT NOW!



2913-B Gaston Ave.

MOTOR GUARANTEED FOR ONE YEAR



Queen Victoria FOUNTAIN

Assemble this beautiful wrought from fountain, which brings new distinction to lawns and gardens. Water the property of the pr Assemble this beautiful wrought iron

MADSEN MACHINE & FOUNDRY WORKS INC. Cornwells Ha'ts., Pa.

URANIUM!! GEIGER COUNTERS

for radioactivity detection and uranium prospecting. All models and sizes available—from low-cost, extra-sensitive, portable detectors to super-sensitive, long range models suitable for airborne or mobile prospecting. FREE INFORMATION.

THE DETECTION CORP. Dept. PS-12 5420 Vineland Ave. North Hollywood, Calif.



Improved design, better value in 1½, 2½, 3,5 H.P. walking tractors. New, low cost, streamlined 2½, 5,8 H.P. walking committee the committee of the committee of

SHAW MFG. CO. 5708 Front St., Galesburg: Kans.



FINE BOWS and ARROWS

SELECTED RAW MATERIALS Catalog 5c send for it

HAND BOOK—Illustrated Instructions on Making and Shooting Archery Tackle-75e

L. E. STEMMLER CO. Manorville (Box 1) L. I. N. Y.



EASY to EARN EXTRA MONEY

You can do it this pleasant sparetime way right in your own home. Cash paid daily. No experience necessary. Write to

NAT'L. ENG., Box 21, Watertown, Mass.

60 POWER TELESCOPE

VARIABLE EYEPIECE 20x-40x-60x-BRASS BOUND

NEW! Three telescopes in one. 3 different magnifications, 20 power for ultra-bright images with 40 and 60 power for extra long range. Guaranteed to bring distant objects, people, sports events, ships, three peoples are expected by the control of In Most power (in Mos

own your own business! earn up to DAY CLEAR your back yard or basement!

MAKE CONCRETE BLOCKS With Amazing New LOW PRICED GENERAL BLOCK MACHINE

NOW! Big Building Boom Profits Withmuch Your Ceach in on the building beom! New high speed, low cost General Block Machine produces up to 1,000 concrete building, garages, Your profit mark-up is 100% to 150%! Fool-proof, and the profit Profits Within Your Reach R.L.T. of

EXTRA!

Amazing Hustrated book gives finer plans for G sensational concrete blees can be sensational concrete blees have been plans for G sensational concrete blees have been port and plans for G sensational concrete build steps, porth and concrete savings. Written by experts - Can save many times the cost of the machinel Get it now!

New York City Reports: "My General

PAID FOR ITSELF IN FIRST 2 WEEKS!"

Thousands now in use the world over Write for FREE details

SEND \$1 - Refunded

GENERAL ENGINES COMPANY

GLOUCESTER, N. J. Dept. S-84, 307 HUNTER STREET,

POCKET PISTOL

LIFELIKE—SHOOTS BLANKS NO POLICE PERMIT NEEDED Looks like versiter unality postert nistol. Precision machined of regular run steel to close tolerances by German guasmiths. Has ruly automatic. Postlive asfery catch, ideal for home protection, sporting events, the ideal for home protection, and the ideal for his contract of h

UNITED ARMS, 9043 S. Western, Dept. BP-401, Chicago 20



WORK CLOTHES!

SURPLUS STOCK FROM MIDWEST SUPPLY FIRM! Terrific values you've got to see to believel

SHIRTS

Made to sell for 2.99! Now Only 4 for \$2.99 What a buy! 4 for the price of one! These shirts, though used, are washed, sterilized and ready for long, tough wear. In blue or tan.

3 for \$5.75

Send name, address, neck size.

PANTS to match

COVERALLS . . . wear 'em used and save plenty! Originally 5.95. Now only

Send-chest measurements.

SATISFACTION GUARANTEED! Your money back if you can beat these bargains anywhere! You can't lose so order TODAY for immediate delivery! Pay postman or eend money with your order and save postage. \$1.00 deposif on 0.0.D. orders.

GALCO SALES CO. Dept. 248

7120 Hervard Ave. • Cleveland 5, Ohio



outlast other toys 3 to 1. Euclid Truck-\$13.95

West \$14.75 Ruckel Lander \$18.95 West \$19.75

For FREE CATALOG write to THE CHAS. WM. DOEPKE MFG. CO., ROSSMOYNE I

Better Than SHOE STORE Your Own AT HOME

No investment, no experience needed, Just show magic cushion comfort to friends, neighbors, to \$4,00 a pair, plus Cash Bonns, Paid Vacation, \$25,00 Reward Offer, Outstanding values for mach women, children, Money supplied without cost Write TO-DAY for FREE new \$4 page callog and full details. TANNERS SHOE CO., 468 BROCKTON, MASS.

Two-Evelet Hit With Cushioned Comfort

"LOOK, DAD! ONE HAND

America's Only Rigid-Tex Double Strength Aluminum Boat



Weighs Only 39 POUNDS

Feather light. Pressed-in ribs Feather light, Pressed-in ribs, Extra rigid, 8' long, 43' beam, Fits in back of most cars. All welded seams. Guar anteed watertight. Styrofoam under seats prevents sinking, Use oars or outboard. Low price, Write today for pic-ture circular. Also larger models, if dealer unable to supply you write us. Dealers

Vio Holda Mfg. Co. Box 915 Toneka 28. Kan



USE THE NATION'S No. 1 WELDER'S GLOVE

You will be convinced

These gloves are made fram (1) finest grodes of chrame split leother (also made in one-finger and full mitten one-finger and full mitten styles). ② The back is cut in one piece eliminoting seams on back of hand which burn through ond rip when exposed to heat. (3) Waol heat breaker stitched inside bock provides gaad insulation against heat during entire life af glave.

(4) Seams ore welted for extra strength ot all points of greatest wear. (3) Thumb seam full-welted. Use STEEL-GRIP quolity.

To be Sure of the Genuine mand This Trade Mark

INDUSTRIAL

INDUSTRIAL GLOVES COMPANY

a corporation 1428 Garfield Street, Danville, Illinois (In Canada, Safety Supply Co., Toronto)



GIANT BALLOONS

Surains U.S. Gov't. (New-Overage) NCOPEKE Weather, target balloons, NCOPEKE Weather, target balloons, the backgrant or for parties, beinles, dances, fairs, MONET-MAKERS. Use these balloons to attract crowds to trade shows. TETRIFIC for lith school and college PROMS. All sizes are approx. Inflated size. Postage paid on prepaled orders.

3 ft. dia, 49c—6 ft. dia, 99c 13 ft. dia, \$1.59—20 ft. dia, \$1.95 add sales tax.

WAR ASSETS DIV. VOLUME SALES CO. Dept. S-8-54, 3930 Sunset Blvd., Los Angeles 29, Calif.



LOUDSPEAKER!

· High sensitivity probe. · Built-in battery checker.

· Low-price long-life batteries. Write for details. Dealer inggiries invited.

140 W. Providencia Ave. - Burbank, Calif.

250 POWER only \$3.49 Complete postpald Telescope Lens Kit

felescope Lens Kit MID postupated programmer pages, Ensiore the Universe, stancts, Moon Craters, New Stars, Complete Lens Kit consists of 80 Incn focal length ground and polished ective ieus, eyenece lenses for 50 POWER, 100 POWER, 350 POWER, and all necessary leas fittings. Easy to make in simple set plus sets Instructions. Cripod and mount not included.)

BUSSE SALES CO., Hartford, Conn., Dept. PS24



F.O.R. NY

28 COMPLETE WITH 1/3 HP MOTOR A.C. 110V STEEL FRAME-TOR-RINGTON BLADE GUARANTEED Yrs. Nema Rated 8050 C.F.M. EASY TO INSTALL & ASSEMBLE

If you cannot visit us send for Fan Parts and Electric

HOMES STORES HOTELS FACTORIES, etc. Motor Catalogue Albin Machine Co. 750 6th Ave., N.Y. 10, N.Y. 10 did Check or Maney Order. 423 W. Jefferson Ave., Detroit 26, Mich. 1529 Vine St., Cincinnati 10, Ohio

c.O.D. send \$5 deposit.

NEW LIFE GUARANTEED FOR OLD TV PICTURE TUBES!



BOOSTUBE SAVES TV PICTURE TUBES!

Sous up to \$60 over new picture tube cost; Weak, washed out, fading pictures from old, long-used tubes become light, bright, sharp — for up to six months — many times longer! Amazing new BOOSTUBE. secret of professional service men, gives them new life! Anyone can install — no wiring needed! Absolutely Guaranteed to please, or purchase price refunded! State TV make, picture size, model number! In possible. Send \$4.59 TODA? to popupaid BOOSTUBE and instructions. Satisfaction completely GUARANTEED!

ALLIED, INC., DEPT. B

2503 N. 3RD ST. . MILWAUKEE 12. WISCONSIN

ELEPHONE



Desk Stand Style

Slightly used but in excellent condition
Many Valuable Uses
Inter-House Phones
Loud Speakers House to Barn, etc.
Educational Purposes, Toys, etc.

Come complete, ready to use \$2.75 Postpaid in U.S.A. Two complete for only \$5.00 II u.S.A. TELEPHONE LAMP KIT—with illustrated instructions for making Desk Telephone Lamp including all parts (harp, nipples, push switch, cord, plug, etc.) ... \$6.50 Ppd. (Shade is not included).

MICROPHONE, Dept. X-1304, 1760 W. Lunt Ave., Chicago 26, III.

PRESSURE GAUGE BLOOD



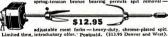
For Home Use. Now you can check your own condition diaily and in the service of t

JOY SPECIALTY COMPANY Scientific Instrument Department

2320-G W. Hubbard Street, Chicago 12, III.

YOUR MOTORIZE BARBECUE!

Easily rigged up by anyone. Handles whole ham or 4 small chickens. Commercial-quality thruout—enclosed gear-head motor (110V-AC) spring-tension bronze bearing permits spit removal-



B & R SALES CO. - Box 952 B - Muncie, Indiana

this **ONE**

GOVERNOR

fits ALL popular farm & industrial gasoline engines



DIERCE LONG RANGE Universal Governor

ONLY 39<u>50</u>

Instant variable speed selection and accurate engine control at any speed setting within 1600 to 2600 RPM. Higher and lower ranges obtainable by simple change of pulley. Also "constant speed" operation.

 Accurate, dependable speed control for engines operating corn shellers, drag lines, hoists, arc welders, trucks and tractors with power take-offs, etc.

Write for Complete Information.

DEALERSHIPS AVAILABLE

"World's Most **Experienced Governor** Monufacturer"

Pulley extra Send Check or

Money Order. State Make, Model of engine.

THE PIERCE GOVERNOR CO., Inc. 1654 Ohio Avenue, Box 1000 Anderson, Indiana, U. S. A.

HO ENTHUSIASTS!

Order Quechenticast terrific accessories and rolling stock!



Car 54 95 Flat Car \$2.50

Girder Bridge \$2.00

-also complete line of model tanks, ships, planes. Send for complete catalogue 35¢ COMET METAL PROD CO.INC.



Just fill in the coupon below to receive a free 2-year subscription. In each issue of Lawn Core you'll discover proctical, seasonal tips on how to make your lown thicker, greener, more beoutiful the whole year 'round. Thousands of readers tell us, "With Lown Care guidance you can have the finest lown on the street." Sign up for O M Scott & SONS CO Lawn Core today!

21 10011	11 311661,	Morysville,	Oillo	WIZO	roio	Alto,	Comorn

Zone Si	tate

"Building Beautifiers" Can Earn High Incomes

Colorcrete, a cementitious plastic, gives lifetime beauty Colorcee, a Cementulous plastic, gives intenine beauty and proceed not often dirty masony—concrete, stucco, etc. — on all kinds of buildings. Tough, tenacious, enduring. Easily cleaned. Helps to daylight dark interiors. Choice of gleaming white or 30 colors. Applied under pneumatic pressure to form an inseparable bond.



More Colorcretors are needed to supply the ever-increasing demand. Low investment appeals to men of limited capital. Work is easy, fascinating, high-

capital. Work is easy, tascinating, high-ly profitable. Broad opportunity to de-velop a lifetime business. No special ability or experience needed because we supply full instructions and sales co-operation. Colorcrete, machine is simple to operate, easy move around. Write today for Opportunity Book.

Colorcreto Industries, Inc. 1972 Ottawa Av., Heiland, Mich.

Spin Fishing Outfit, only \$9.951

Positively no backlash with UNITED'S quality spin outfit, Offer includes a sturdy, feath-



Free Literoture





Ask the first 10 . . . or 20 . . . or 50 people (householders, farmers, businessmen) that you meet: "Do you own a personal safe?" 90% will answer "No." Yet every one has valuables and papers that need fice and the safe for the valuables and papers that need fire and theft pro-tection. Only SENTRY has what it takes to capture that market—quality,

takes to capture that market—quality, appearance, and a price that opens every pocketbook, yet gives you a healthy profit. Choice, exclusive territories. Drop shipment if desired. Send for full details. Write to Dept. PS-8 giving address, including county.

BRUSH-PUNNETT 545 WEST AVE., ROCHESTER 11, N. Regular Price of a Slide Rule \$4 and up

lide Rule

Gene Loewy, 545 5th Ave., Dept. 44-T, N.Y. 17



MALIBU ARCHERY CO., Dept. N8,3156 W. 8th St., Los Angeles 5, Calif. The Original EM-GE

Blank Pistol Free! Mother of Peari Handles with each EM-GE

In spicarance it looks like any fine actual pocket pistoi! Compact, it is precision machined of real gun steel. Equipped with safety catch to prevent accidental firing, a six shot, magazine and built-in cartridge ejector. Ideal six shot magazine and built-in cartridge

for sporting events, theatrical purposes, home protection, dog training, etc. 3½" long. Only \$9.95. Chrome Perfecta \$14.100 Cartridges, \$1.50, F.O.B. N. Y. No police permit needed. Godfrey Import Corp., Cept. P.S., 277 Broadway, N.Y.C. 7, N.Y. BUILD YOUR OWN FAN

propellers for coeling and superior policy of the propellers for coeling and superior superior policy of the propellers for coeling and superior superior policy of the propellers for coeling and s

C.O.D. or each with order. KLOPPENBORG ALUMINUM FDY., Dept. PS-54, Davenpert, lowe



RELIEF ... OR YOUR MONEY BACK Write now for free booklet and pictures of rupture care. You can be helped...work steady, with low cost, easy to wear Web Truss, thousands satisfied. Dept. PS-8, Hagerstown, Maryland



Enjoy z-wheel drive pep, speed, extra mileage, and the per speed of the pe

WARN MFG. CO., Riverton Bex 6064-BD Seattle 88, Wash,



ELE-CONTAINED DIVING

DIVERS CORP. 1045 Broxton Ave., W. Los Angeles 24

1954 CATALOG - Send 25c 41 models for '54! See World's finest line before you buy, Rated tops in design, styling, perform-ance by the experts. '54 Catalog plus booklet "Boat Selection, Operation, Maintenance" \$1.00

Over 100 Modern plans and full size patterns. Racing classes, cruisers, inboords, autboords, soil boats. By famous designers. 6' to 30'. DESIGN CATALOG only 35f. For Design Catalog plus boot building hand-book send \$1.00.

CUSTOM-CRAFT (DEPT. B) BUFFALO 7. N. Y



Guaranteed far Life of Car on Which Originally Installed

Order from R. V. LEHNER, NESS CITY, KANSAS

NEW! TRANSISTORIZED WRIST RADIO



Distributors

Wanted

BUILD LITTLE MITE . how to do ONLY \$198 pp

A busic lit comprising an attractive plastic case Iprodrilled).

"outline" chastis, battery clip assembly, and herdware \$1.98 postantic Combination of book and basic kir, special \$2.50 Compilets kirs and soft assembled on order. Sand 25e for schematic diagram and descriptive folder,

HUCKERT ELECTRONICS, Box 7400, Woshington 4, D.C.

Level-X Car Compass COMPASS LEVEL GAUGE

· ACCELERATION INDICATOR - all in one -

Fits any car. Compass easy to compensate a grades up or down to 20 degrees (equal of the first early construction of the first early cars, trucks, tractors, ay money back guarantee. Send ONLY ours today?

LEVEL-X, INC.
Suite S-7, 627 Salem Ave.
Dayton 6, Ohio
Ohio Residents add 15c sales tax

5495

Don't get stuck with a rust-clogged radiator!



At the first sign of overheading

use new, improved

Du Pont COOLING Cleanser

If a rusty radiator causes your engine thermometer to read high on moderate summer days, don't wait for a scorcher. Put in Du Pont Cooling System Cleanser right away. It cuts grease with detergent action, cleans out scale, and dissolves rust so that water drains out clear. And neutralizer in each can completes the job, Du Pont Cooling System Cleanser is thorough, safe, simple,





Keep your radiator clean with new

DU PONT ANTI-RUST

Once your cooling system is clean, keep it that way with Du Pont Anti-Rust. This new liquid inhibitor retards rusting, inhibits acid formation and lubricates the water pump as well!

DU PONT Nº 7. PRODUCTS

From Chemical Research . . . For Easier Car Care



BETTER THINGS FOR BETTER LIVING ... THROUGH CHEMISTRY

POPULAR SCIENCE . Last-minute

news & notes

WEATHER REPORTS WHILE YOU DRIVE are now displayed along the Pennsylvania Turnpike. Automatic signs (connected to a rain-catcher, a temperature element and an electric eye that detects fog and smoke) show condition of the road ahead... Spare parts might be telegraphed anywhere in the world, suggests F. W. Cunningham of Arma Corp. Automatic machine tools can be controlled by patterns of holes punched in paper tape. These patterns, if coded for a teletypewriter, could be transmitted and used to manufacture the parts. ...

A "SUBMARINE" THAT DIVES, ROLLS AND TURNS BUT NEVER GETS WET
will be built to train sailors. Operating much like
Link airplane trainers, it will duplicate a real
sub's control room. Electric Boat Co. is to build
it...Another way to make electricity from sunlight
has been invented by the Air Force. Unlike Bell
Labs' solar battery (PSM, July '53, p. 71), which
contains silicon, this one uses cadmium sulfide.
A four-by-15-foot slab would supply an average
house...3-D radar, a big help in controlling aircraft traffic, is being developed by several
companies. Some proposed systems use mirrors or
lenses to separate right- and left-eye images,
eliminating polarizing spectacles.

A MUSICAL DOUBLE PLAY WAS OVERCOME at Chicago's outdoor concerts this summer by installing delay units in the loudspeaker system. Audiences had complained that they had to listen to the music twice, first from the loudspeakers and then from the band shell itself. To cure this, the delay units now record the music on tape, pause a moment, then run it off through the speakers so that sound from both speakers and shell reaches the listeners simultaneously...An "electronic doctor" will watch over patients on the operating table at one hospital. It keeps a continuous check on blood pressure, heartbeat and breathing. Thus



the surgeon can know immediately if trouble develops. The Physiological Monitor was made for the Veterans Administration by the Bureau of Standards... Watch your car closely, warns the FBI. Auto thefts, which dropped after a wartime high, are climbing sharply again (see chart at left, prepared from FBI statistics on city crime).

Reading time: 3 minutes to learn how to

- cut engine wear up to 38%
- prevent loss of power, compression
 save 15%-25% on oil . . . without ever
- changing your oil filter

This Gadget is Worth \$320,000,000

and I Discovered it by Accident!

by Albert Wells

T ALL STARTED the day I got the bill: \$214.36 for an engine overhaul—and I had only 28,000 miles on

I told my troubles to a neighbor—a lubrication engineer-told him how I'd always changed oil every 1500 miles, changed filters every 5,000 miles. His answer

"You've been wasting your money," he said. "We've spent millions developing oil additives that keep carbon, gum and abrasives from damaging your engine. Your oil costs about 15¢ more a quart because of those additives. Yet oil filters on the market today are made of rag or paper-they soak up additives like a blotter. The more often you change oil filters the more money you waste!"

But don't I need a filter to take the impurities out of the oil?" I asked.

He took a deep breath. "This will really shock you. Engine damage is done by abrasives 10 to 40 microns in size (a micron is .000039"). Your oil filter can't take them out because rags or paper can't be packed tight enough without stopping oil flow when the fibers soak up oil and expand."
"Isn't there any kind of filter that does the job it's

supposed to do?"
"No, except for the porous bronze filters they're making

for supersonic aircraft. And you can't buy a filter like

that for your car.

I asked myself: "Why not?" Next day, I tracked down the outfit that was making the filters for aircraft, and got the answer. These porous bronze filters were made by fusing together millions of tiny bronze balls. Non-absorbent, they didn't remove additives, yet they removed abrasives in the 10-to-40 micron danger zone. Could they be made for automobiles? Again, the answer floored me.

LIFETIME FILTER TESTED IN CARS, TRUCKS, BOATS

Test models had already been used in cars and trucks

OPPORTUNITY FOR DEALERS AND DISTRIBUTORS

A dealer and distributor network is now being formed to handle demand generated by advertising and editorial features in national magazines. If you can qualify, you can be first with the most exciting automotive product of this decade, to win new customers and build a substantial business. These valued franchises are not being sold; they are awarded on the basis of ability to grow with us. For complete details, write or wire: Continental Manufacturing Corporation, Dept. FPS-8 Washington Blvd. & Motor Avenue, Culver City, Calif.



for millions of miles, proving the porous bronze filter: 1. Never needs replacing. 2. Saves the quart of oil thrown away with ordinary filter packs. 3. Increases engine life.

Trouble was, almost the entire production was being absorbed by military and industrial users.

That day I went to work on the biggest job of my life: setting up production of the Lifetime porous bronze permanent filters for cars and trucks (an estimated \$320,000,000 replacement industry).

HOW TO GET A LIFETIME FILTER FOR YOUR CAR

Try the Lifetime filter on your car for 2 weeks: if it isn't all I say, you get your money back; if you keep it, you're through buying filter packs-the Life-time filter is guaranteed for 10 years.

For complete unit, including case (install on any car in 10 minutes), send make, year and model of your car and \$12.95 (we pay shipping).

For conversion kit, which replaces your present filter pack with Lifetime bronze, send make and number of filter and \$6.95 (we pay shipping). NOTE: a few cars have full flow systems; conversion kits for these are \$13.95.

Or send only \$2 deposit, pay rest C.O.D. But do it today don't waste another cent on filter pack replacements!

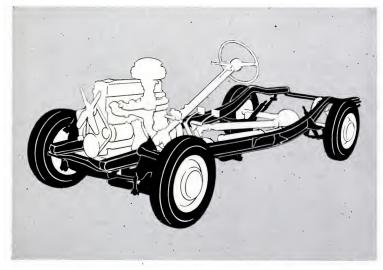


Complete Lifetime Filter; fits any car.



Lifetime Conversion Kit; replaces ordinary packs with perma-nent bronze element.

	AL MANUFACTURING CORP.
	vd. at Motor Ave., Culver City, Calif.
Ship Comp	
	make, model, year of car
□ conve	sion kit for
	make and number of present filter 2.95 for complete unit (\$18.95—chrome) .95 for conversion kit (full-flow, \$13.95) .00 deposit; send C. O. D.
Name	
Address	
City	ZoneState



Advanced Chevrolet Engineering brings

BALANCED CAR SUSPENSION

for greater riding comfort

Behind Chevrolet's big-car riding ability is a lot more than just a suspension system. Actually it's a balanced combination of size, weight, weight distribution, tires and suspension system design that gives you that smooth ride you expect of a Chevrolet.

First of all, Chevrolet offers plenty of room in its wide, comfortable seats, cradled between front and rear wheels where they're least affected by road bumps. Chevrolet is a heavy-weight in its field, and the pounds are nearly equally distributed on all four wheels for greater stability.

Then in the suspension system itself: Famous Unitized Knee-Action, exclusive with Chevrolet in its field. A front ride stabilizer that reacts against any body roll tendency. Long, resilient rear springs that, leaf by leaf, diminish road vibrations. Tension type shackle hangers that regulate rear spring deflection rate and provide for a uniform ride regardless of the number of passengers. And, double-acting airplane type shock absorbers that not only cushion spring action but stabilize roll and body sway as well. See your Chevrolet dealer and try out a new Chevrolet. See if Balanced Suspension doesn't

give you a much smoother ride. . . .

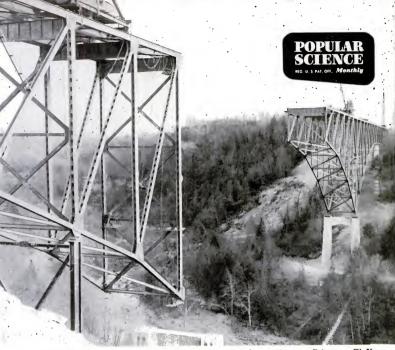
Chevrolet Division of General Motors

Chevrolet Division of General Motors, Detroit 2, Michigan.

EVER FINER ENGINEERING



EVER FINER CHEVROLETS



Steelwork for the two-lane expressway reaches across a deep ravine near Princeton, W. Va.

Newest Super-Road Hops Daniel Boone's Mountains

Vaulting over rugged valleys, West Virginia's highway in the sky, open this month, crosses 76 bridges in 87 scenic miles.

By George H. Waltz Jr.

A SUPERHIGHWAY that engineers and traffic experts are calling "the most spectacular road in America" opens its tollgates to the public this month. This new road is the West Virginia Turnpike—a hill-hopping heavy-duty highway that stabs through rugged mountains where no good roads, and no continuous railroad line, had ever been built. The

AUGUST 1954 65



ROAD BUILDERS' OREAM of a north-south chain of express highways from the Great Lakes to southern Florida begins to come true with the opening this mouth of the West Virginia Turnpike. Map shows status of missing links and how new highway will connect with toll route now open, under construction or authorized from the East Coast to Chicago.

mile-a-minute super-road is the first completed link in a 1,300-mile Great Lakes-to-Florida chain of high-speed highways proposed by the traffic officials of West Virginia, Virginia and North Carolina. It cuts driving time between Charleston, West Virginia's capital, and Princeton, on the Virginia border, from nearly four hours to less than two.

An Up-and-Down Texas

Anyone who has ever driven in and around the mountains of southeastern West Virginia—and up until now that's all you could do—will never forget the almost virgin ruggedness of the country. As one of the new road's engineers put it when he first viewed the waves of hills that roll toward the south, "I'd bet that if West Virginia were flattened out, it

would be twice the size of Texas!" And he was a Texan.

The new 87-mile high-speed highway does flatten out the mountains with deep cuts and leaps their valleys with bridges —76 of them, or almost one to a mile. In one six-mile stretch southeast of Charleston there are eight long spans and 20 high fills and embankments that bridge the valleys to smooth out the ridges. Few crows could now fly a straighter or more level course between Charleston and Princeton.

When you enter the road at Princeton, its southern end, you find yourself on a smooth two-lane concrete highway, each lane 12 feet wide and flanked by a nine-foot-wide macadam shoulder. Your elevation is 2,400 feet.

Steepest Grade Is Five Percent

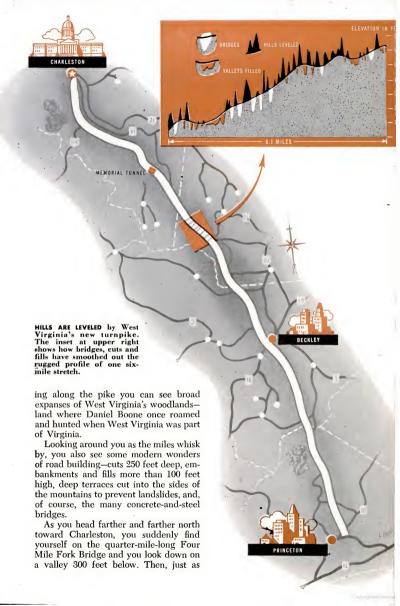
Some 18 miles farther north you find yourself on Flat Top Mountain, elevation 3,200 feet, the highest point on the road. From there your descent is gradual, until you finally drive into bustling, industrial Charleston. Here the elevation is only 600 feet.

In spite of this half-mile difference between the road's loftiest and lowest points, you never hit any hill that climbs more than five feet in every 100 feet (road builders call that a five-percent grade).

Most of the grades along the route don't exceed three percent—no hill at all compared to the region's old rollercoaster roads with nine-percent grades that almost stop a truck.

Besides leveling off the hills, the new turnpike has also ironed out the curves. Tight and blind 50-foot-radius curves are about par for the old, roundabout Charleston-to-Princeton route. On the new highway, you never ease into any curve with a radius of less than 1,000 feet and you can always see at least 600 feet ahead.

As you drive along, you see views of mountains and valleys that no motorist has ever seen until now. The older roads snake around the mountains, with intervening peaks cutting off the view. Roll-





Bulldozers level a deep cut blasted through shale and sandstone for West Virginia pike.

suddenly, you plunge into the half-milelong Memorial Tunnel, which bores through rock 600 feet below a mountain top.

During the course of your drive over the pike you see another highway innovation. In the spots where there are sustained upgrades (even though none exceed five percent), 12-foot-wide "creeper lanes" have been provided for trucks. These allow heavily laden cargo carriers to pull off to the right where they won't slow down the normal flow of fastermoving passenger cars.

Plans Call for Future Widening

Eventually, when traffic warrants it, the road will be widened to four lanes throughout most of the route. Four lanes are already provided at the road's six interchanges, and the necessary grading for an additional 30 miles of dualization has been completed.

Close to 12,000,000 pounds of dyna-

mite were needed to blast out the deep cuts and to provide fill for the many embankments. In the year and a half of work, the road's builders—under the supervision of Howard, Needles, Tam. men and Bergendoff, the engineers who also masterminded the construction of the Maine and New Jersey Turnpikesexcavated and moved more than 31,000,-000 cubic yards of dirt and rocks. That's enough rubble to fill 2,000,000 big earthmoving trucks.

Fifteen miles of streams and creeks had to be diverted and about 35 miles of existing roads had to be relocated to make room for the new highway.

Yet, when all the tabs are in, the cost of the present two-lane, wide-shoulder road isn't expected to total more than \$1,300,000 a mile. That compares favorably with the \$2,000,000 a mile, fourlane New Jersey Turnpike that was constructed on relatively flat land. The toll, about 1.8 cents a mile for a passenger



Form on rails speeds pouring of concrete walls of half-mile tunnel through a mountain.

car, is in line with those of other highspeed roads.

With this first link—and the most difficult one to build—in the projected northsouth road chain now open, construction on two adjoining links is expected to get

under way. Virginia is about to start on a sister turnpike that will cut across the southwestern corner of the state, joining up with the southern end of the West Virginia pike and extending to

the vicinity of Mt. Airy, North Carolina. There it will link up with the projected North Carolina Turnpike that eventually will take the tourist through to Charlotte near the South Carolina border.

Plans for similar connecting highspeed roads in South Carolina, Georgia and Florida are under consideration. Plans are also afoot to extend the West Virginia Turnpike northward with two spurs, one to Parkersburg on the Ohio border and the other to Wheeling, to provide connections with the existing Pennsylvania Turnpike and the under-

construction Ohio Turnpike.

In the meantime, however, the completed West Virginia Turnpike will help to bring the motorists in the morth-central section of the country

closer to the vacation lands of the South, and to bring the products of the South closer to the industrial areas of Detroit, Cleveland and Pittsburgh.

During the first year, turnpike officials calculate that more than 2,133,000 drivers will use the highway. In 1958, they expect the total to be over 3,000,000. END

- HINT TO AN UNHANDY HANDY MAN

I found a loose joint in the gas line
Producing a bothersome hiss.
To make it up tight, I flipped on the
light
[siyl syll diff syl fo mo sumo puy

-Hool Lineback



Sandhogs Go Way Down Deep to Help Build Chicago Skyscraper

THE workman above is riding a bucket down a caisson sunk to bedrock 102 feet under a Chicago street. Filled with concrete, the shaft will support a load-bearing girder of the 41-story Prudential Building, now going up two blocks from Lake Michigan.



Bike Pedals Pump Up and Down

JOSEPH BENOTTEAU, a French inventor, figured you waste a lot of energy propelling a bicycle by pushing the pedals around in a full circle. He altered the bike as shown at left, and now an up-and-down pumping motion keeps it moving.

▶▶►Helicopters now blow raindrops off ripe cherries so that the fruit won't split, and be ruined by the water. The violent downblast of the rotors does the job.

Skin Divers Seek Undersea Oil

Skin divers are going down as deep as 250 feet in the Persian Gulf to look for oil deposits. Led by Comdr. J. Y. Cousteau, famous French underwater explorer, a team of divers brings up rock samples for geologists of the Anglo-Iranian Oil Co.

A diver descends to the floor of the gulf in a sharkproof cage (right). He quits the safety of the metal bars to chip rock from the sea bed (center photo) and returns to the cage to deposit specimens (far right) or to make the ascent. But the cage is always nearby for a strategic retreat from snapping jaws, in case a maneater puts in an appearance.









Scientist wants to shoot up midget moon as

Poor Man's Space Station

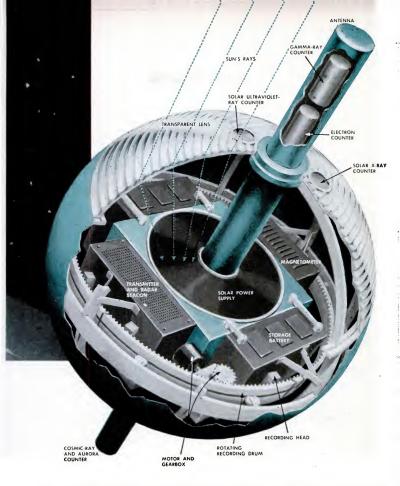
Spinning high above the earth, this MOUSE satellite would explore solar mysteries hidden from us by the atmosphere.

By Herbert O. Johansen

FOR a space station that would circle the earth as an artificial moon, the MOUSE is as modest as its name. It

would be small enough to be built in your basement. It would have no ambitions for interplanetary flight, yet it would be able to probe far enough into space to study mysterious solar and

- any a large



cosmic radiations that now are hidden from us by the atmosphere.

The man who wants to build the MOUSE (Minimum Orbital Unmanned Satellite of the Earth) is a serious, 29-year-old physicist at the University of Maryland, Professor S. F. Singer.

Dr. Singer's midget mcon would be no

military stronghold or bombing platform in outer space. Its mission would be peaceful. Circling at about 200 miles above the earth, it would carry not even a live mouse or monkey. It would use instruments to make its studies of the upper atmosphere and report back by radio new clues as to how the sun's radi-

ations affect our everyday lives in the forms of magnetic storms, the ups-anddowns of long-range radio communications and weather.

What Dr. Singer has conceived for the

job is a spinning, hollow aluminum sphere, about two feet in diameter and weighing 100 pounds or so. Most of the weight would consist of electrical-power equipment and the instruments for measuring cosmic rays, solar ultraviolet rays and X rays. The whole thing, he believes, could be put together for about \$50,-000. That wouldn't even buy standing room for a midget on one of those fancy, giant space platforms that would weigh many tons and carry a prohibitive price tag of around four billion dollars.

To get his MOUSE up there, Dr. Singer would use a three-stage rocket. This would bring the cost up to only about \$1,000,000. That, he points out, is less than the cost of a single jet-fighter plane. He feels that existing military sounding

rockets or models under development could do the job. At the recent Third Symposium on Space Travel, held at the Hayden Planetarium in The American Museum of Natural History in New York.

he described the MOUSE as "a logical extension of the high-altitude research which we have been conducting in rockets over the past eight years."

For launching, Dr. Singer sees his MOUSE mounted and already spinning in a nose cap atop a pyramid of three rockets, with a modified V-2 as the springboard. As the V-2 was fired. the unit would leap straight up. Then, at about 50 miles up, it would start to curve slightly as the V-2 burned out and dropped off. Speed would be 7,200 miles an

hour. As the second rocket

took over, the truncated pyramid would gain speed and altitude. The curve would increase. At close to 200 miles up, as the second rocket burned out, speed would be 12,600 miles an hour, and direction almost horizontal.

STAGE 3 APPROX MOUSE SPEED 4 B MILES PER SECOND STAGE 2 APPROX STAGE 1

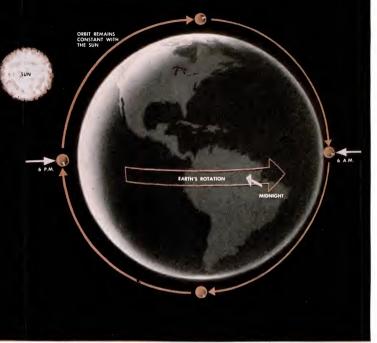
DR. S. F. SINGER, designer of MOUSE, is a veteran of

high-altitude research and

an expert on cosmic rays.

HOW THE MOUSE ARTIFICIAL MOON would be launched. The small satellite sphere would be mounted in gimbals on top of a threestage rocket. Before take-off, the MOUSE

would be started spinning on its horizontal axis. Each stage of the rocket, as it fired, would boost the satellite to a higher altitude and greatly increase its velocity.



AS AN ARTIFICIAL MOON, the MOUSE would circle the earth over the North and South Poles once every 90 minutes. Since the orbit would be in a plane perpendicular to the

sun-earth line, it would always appear overhead at either 6 a.m. or 6 p.m. local time. Spinning action of the MOUSE would keep same end of the satellite always facing sun-

Now the third rocket would fire for the final boost. Its job would be to kick the MOUSE up to its final altitude, a little more than 200 miles above the earth, and to its orbital velocity of 17,-280 miles an hour.

At that point, about five minutes after take-off, the MOUSE would be sprung from its bearings to continue on its own in an orbit forming a great circle, going over the North and South Poles once every 90 minutes. And the burned-out third rocket would come tumbling after, itself a satellite.

The MOUSE, now an artificial moon, would have to be stable in traveling its

orbit. This would be taken care of by the spinning action started before takeoff. It would continue to spin in its orbit, but if necessary, small vanes in the satellite's skin would enable even the thin air 200 miles up to maintain the spin.

Windows to Let in Sunlight

This spinning not only would stabilize the MOUSE in its orbit, but because the orbit is over the poles instead of following the equator, the same end always would be facing the sun. Thus this end, in the form of a plastic lens, would admit the maximum of sunlight to activate a

[Continued on page 222]

AUGUST 1954 75



Army Tries New Marsh Buggy

THE 22½-foot marsh buggy above is reporting in to the Army for field tests. Six 10-foot tires wheel it through sand and muck, or up steep banks. With rubber-

10-foot tires wheel it through sand and muck, or up steep banks. With rubber-cleat chains added, the Gulf Oil vehicle takes to water like a paddle-wheel steamer.



Inspector Gets Bird's-Eye View

The engineer—way up there—had to ride a bosun's chair to inspect this transformer, largest of its type. A three-story, 50,000-pound monster, it has 50 miles of wire and a ton and a half of insulation. General Electric will use it to test circuit breakers.

Machine Rides Track It Lays

THIS mechanical track layer, humping itself along the very rails it later will lay on ties, is putting down almost a half-mile of track a day in Germany. Spanning the roadbed, it drops the rails—each 131 yards long—on ties as fast as these are put in position.

They Say Now

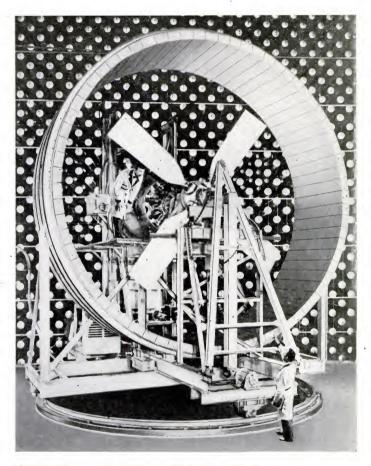
L. E. Briggs. Ford Motor Co.: "If tomorrow's car is to travel twice as fast as today's, it must first be made twice as safe."

Francis K. McCune, general manager, GE Atomic Products Division: "Electric utility companies will be owning and operating a number of atomic power plants within the next 10 years."

WILLIAM H. WARD, VICE-PRESIDENT, THE DU PONT Co.: "The number of new chemicals which can be produced is almost infinite and the research laboratories develop about 10,000 every year."

MAJ. ALEXANDER P. DE SEVERSKY, PIONEER AIRPLANE DESIGNER: "The electronic capabilities of a combat aircraft have become even more decisive than its firepower."

EARL C. Kubicek, Illinois Institute of Technology: "It wasn't long ago that most companies would hire anyone who could handle the job. Now they are looking for applicants who show the greatest promise and who will stay with the company."



Giant Gyroscope Tests Turboprops

ACAINST a polka-dot background of sound-proofing, high-performance propellers get the works in this gyroscopic whirl-rig that simulates actual flight-testing. When a propeller is spinning at high speed, the whole rig, mounted on wheels, can turn on a 20-foot circular track to duplicate side-

sway in flight. For safety, a 21-foot-diameter, barrel-like guard rim is lined with railroad ties. Engineers at the Caldwell, N.J., plant of Curtiss-Wright, who designed the device, say that because of greater control, it is more efficient than testing new prop units in an airplane.



LITTLE JET, named A4D Skyhawk, here carries extra fuel tank under fuselage. Presumption

is that atom bomb would be mounted there. Two other extra tanks can attach to wings.

Bantam Jet Can Tote A-Bomb

A BANTAM bomber is being built for the U.S. Navy. It's smaller than most fighter planes. It may well be the smallest bomber in the world.

Yet it is built to carry an A-bomb. With extra fuel tanks, it can span the U.S. nonstop. At sea, operating from a carrier, it has a combat radius of 1,200 miles. It's fast. Douglas Aircraft, the builder, says it can outfly a Russian MIG.

Jet fighters weigh up to 40,000 pounds. The bantam bomber, which is powered by a single engine, tips the beam at less than 15,000 pounds.



BANTAM'S WEIGHT was cut by use of lighter components. Woman officer easily lifts 30pound pilot-ejection seat (left), while two men wrestle with regulation 70-pound seat.



PACKAGE COMMUNICATIONS INSTALLATION, weighing 105 pounds, is held by Ed Heinemann, factory engineer. In foreground is standard equipment, totaling 160 pounds.









Special Section of Money-Saving Ideas For Your Home

The September issue of PSM will be packed with new ideas for every part of your house, from basement to attic. They'll save you money, add value to your home. Don't miss this bonus issue.







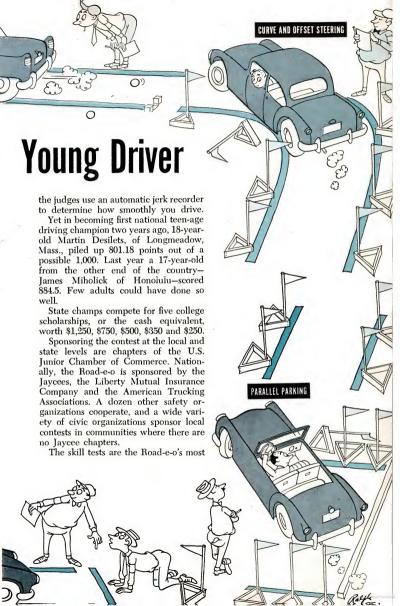


For the third consecutive year, POPULAR SCIENCE MONTHLY has been honored for exceptional service in the nationwide fight against accidents, PSM won a 1953 Public Interest Award, granted annually to information agencies by the National Safety Council. The citation is in the form of a wall plaque, pictured at right.

Accompanying the announcement of the award, which also went to 12 other national magazines, was praise for the winners from Ned H. Dearborn, council president: "Their initiative and skill are . . . really giving safety a voice that can be heard."









SERPENTINE MANEUVERS are traced by a car's headlights in multiple-exposure photo at night. Entrants thread the course forward and backward, are docked for jerky driving.

spectacular offering. At all three levels—local, state, national—they start with something innocently called Straight-Line Driving. Anybody can drive straight, of course; the trouble is that here you have to prove it by keeping the left wheels of your car in a lane marked by five pairs of teed-up rubber balls, each pair so close together that you graze one if you miscalculate by even a whisper.

No Rubbernecking in Reverse

Going forward is not extraordinarily difficult, but now try it the other way—fine practice for backing down the driveway without touching a newly planted lawn. You get docked for every ball you nudge and for every time you stop. Entrants have picked their way through without grazing a ball but been penalized most of their score for leaning too far out to see where the darn things were.

Next, in the local skill test, you wind your way through a row of barrels sitting in the middle of a space that looks scarcely wider than a one-lane road. You lose points for every instance of jerky movement, uneven speed, and of stopping and backing to avoid hitting an obstacle. Then you do it backwards,

For the third problem, you breeze along for 150 feet, drive through a gateway as narrow as a garage door at 20 miles an hour, and then stop with your front bumper directly over a chalk line. You'll lose two points for every inch you travel past this marker, and one point for every inch you fall short. And if you fail to stop smoothly, you'll lose 15.

Parking: Only Perfection Will Do

All you have to do now is to park parallel to the curb—with points off for failing to make proper signals, backing more than three times, racing or stalling the engine, hitting the stanchions that mark the stall you are trying to get into, and striking the curb.

At the state Road-e-o, the skill test is much the same except that the 'roundthe-barrel problem is replaced by something called Curve and Offset. You ease around a sharp curve, find yourself in a narrowing right lane, and then swing suddenly but smoothly to the left and straighten out—without brushing any stanchions. Next you retrace your course, backward.

The chief change in the national, except for a general toughening up, is the introduction of a problem that might be called "Please Put the Car Away." Here you turn from the street into a twisting driveway and then into a garage that wasn't built for these wide modern cars. Only a few of last year's state champs got in and out of the garage smoothly.

The course was laid out in Washington's National Guard Armory and some of the drivers found it hard to remember that they had to make hand signals even though they were indoors. It was odd to be driving on a wooden floor, too. Furthermore, each champ was using a strange car—a new Ford, Plymouth or Chevrolet, with standard gearshifts. But Road-e-o officials said the teen-agers did amazingly well. "A lot of adults," the course steward added, "can't back out of garages as these kids do."

Show Goes on the Road

In state and national Road-e-os, the obstacle course is followed by a road check. The one in Washington runs to 7½ miles. All you have to do is drive through the worst of the capital's traffic while a judge sitting beside you in the dual-control car tells you what to do and checks off on his chart how you do it.

It's almost unbelievable how many mistakes can be made in the course of a 20-minute ride. The judge's chart lists 128 possible errors. Thirteen arc things you can do wrong just in getting into the car and pulling away from the curb. Others are common driving mistakes. (Do you ride the clutch? Do you scoot across intersections? Do you rest your elbow on the window frame?) Attitude is important, too. Cockiness can cost you a pocketful of points. So, on the other hand, can hesitancy.

[Continued on page 236]



STRAIGHT-LINE-DRIVING TEST requires contestant to keep his left wheels on a path between balls 11½ inches apart. Going forward, he must do this while shifting up one gear.



STOPPING SMOOTHLY, driver must brake down from 20 m.p.h. in 40 feet and stop with his front bumper directly above the white line. Performance is measured in half-inches.



Italy's Plates Light Up

ITALIAN traffic cops are going to have a lot less eyestrain—and speeders a lot more tickets—if a new license plate now on trial in Rome is adopted for official use.

Numbers made of white transparent plastic are set over cutouts in the metal and lighted by a lamp

behind the plate.

As shown in the photograph, the illuminated plate on the right of the car is considerably easier to read, especially at night, than the regulation license plate carried on the car's left.

▶▶▶A new process impregnates paper with a chemical that kills germs. It is expected to be used in making napkins, soda straws and paper cups. And bakeries can now buy waxed wrappers with a built-in aroma of fresh-baked bread, white or rve.

New Big British Tank Gits Thar Faster

FAST and highly maneuverable, Britain's newest heavygun tank—the Conqueror at right—is so big it's said to dwarf a previous type that weighs 49 tons. Actual details are secret except that it carries a four-man crew.





New Big U.S. Tank Packs the Mostest

OUT in front at left is Uncle Sam's mightiest tank—the long-secret T-43. The 60-ton monster mounts a long-barrel, 120-mm. gun—enough firepower to outslug any tank in the world. Three machine guns on the turret can be loaded, aimed and fired from inside to protect the tank's five-man crew. Behind the T-43 are an M-47, a Patton-48 and a Walker Bulldog, all postwar tanks.

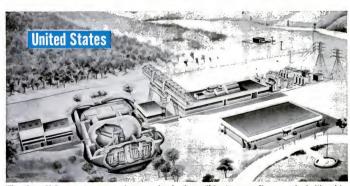


England's first atomic-power plant, fast being built (inset), will look like this model,

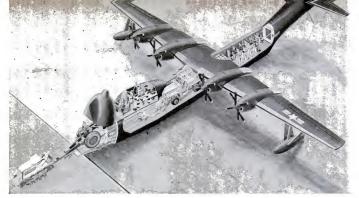
Britain Leaps Ahead of Us in Race for Atomic Power

REAT BRITAIN is a broad jump ahead of the U.S. in the effort to produce electricity from atomic energy. The walls of England's-and the world's-first commercial nuclear-power plant are already rising from the pastures of a former dairy farm in the mountainous county of Cumberland. The plant is expected to start producing around 50,000 kilowatts of electricity by the fall of 1956.

The first American atomic-power station, to be run by the Duquesne Light Co. of Pittsburgh, is still in the blueprint stage, with only an artist's conception (below) to show how it may look when, in 1957, it begins putting out 60,000 kilowatts.

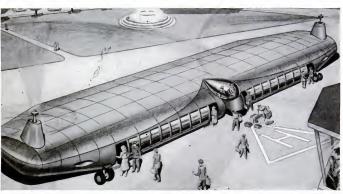


The first U.S. atomic-power plant, to be built at Shippingport, Pa., may look like this. AUGUST 1954 85



Flying LST to Land Troops, Guns on Beach

What the famed water-bound LST landingship did during World War II, this flying version can do, but hundreds of miles an hour faster. It is the R3Y-2, a nose-loading model of Convair's turboprop Tradewind. In action, the big plane will land offshore and taxi to the beach. In a matter of seconds a bow ramp will be lowered to unlead Marines, guns, trucks and supplies. To pull away from the beach, the pilot, sitting in an upper-deck crew compartment, will simply reverse his props and back up.

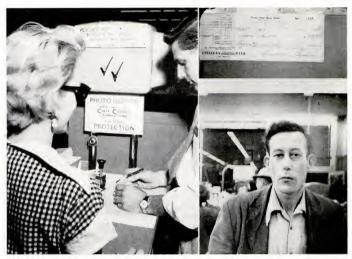


All-Wing Helicopter to Fly Sideways

A FLYING-WING passenger helicopter is the newest idea in whirlybirds. It would travel sideways instead of pointing its nose in the direction of flight.

The novel scheme was born when Bell Aircraft pilots were testing a Navy antisubmarine, taudem-rotor helicopter. During test flight, the pilots began to favor sideways

flight because "it just felt better." From there on company engineers took over and came up with the sideways-flying design shown in the drawing above. They claim that it will be more efficient, since the wing itself will supply some of the lift. Thus less power will be required from the rotors, saving fuel.



Double-Eye Recording Camera Traps Bum-Check Passers

WHEN Thomas M. Lee cashed a check in a Los Angeles supermarket he saw the clerk photograph the check in a new machine. What he did not see was that the machine also photographed him—through a lens concealed behind one of the check-mark symbols in its front (above left). That's how Lee's picture (above right) got on a manwanted circular issued by the Los Angeles Police Dept. The cops say the check was forged. The machine is distributed by Dubl-Chek System, 8301 Sunland, Los Angeles.



Troopers Set Road Traps for Trucks That Tote Too Much

Drivers of overloaded trucks are casting a wary eye around corners of California roads these days. Lying in wait may be a framework of metal holding four scales. If a truck driving over the weighing platform carries cargo too heavy for the number of its askes, a state trooper hands the driver a court summons. Surprise is what catches the guilty—truckers never know when the rig will be set up along their routes.

How to Shoot 158 Miles... Straight Up

The slender cylinder being towed by the jeep in the picture below could be full of carrot juice or cooking gas. Actually it's full of delicate machinery, it's worth half a million dollars, and it's about to be shot almost 160 miles straight up—29 times higher than Mt. Everest.

Shooting a rocket into space is a complicated business, as shown by these pictures of the Viking missile—the most elaborate



ROCKET RIDES to launching area on three wheels. Its engine, made by Reaction Motors, delivers thrust of 20,000 pounds on diet of liquid oxygen, alcohol, peroxide.



2 INTO GANTRY FRAME goes rocket to get nose, tail. Nose totes instruments.



TOP POLISHED LIKE MIRROR, missile is now ready for fuel. Total length: 45 ft.



A FIREPROOF-SUITED CREW pumps highly explosive peroxide into fuel tanks.



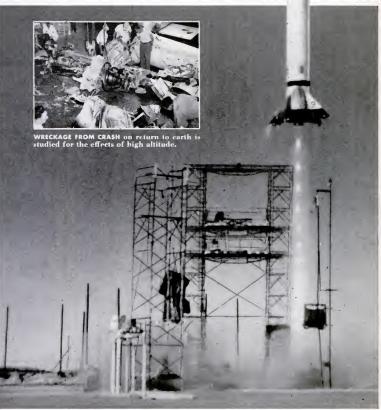
5 FIRING TIME is only minutes away as Viking poises on small launching platform.

ever released by the Government's White Sands Proving Ground.

Looking like an overgrown stovepipe, it must be hauled to the shooting site and have its needle nose and tail fins added. It is fueled as its liquid oxygen-at minus 300 degrees F.-boils.

Built by the Glenn L. Martin Co., this

type of rocket holds the new single-stage height record of 158 miles.



THUNDEROUS ROAR of engine sends 71/2-ton rocket skyward. Blanket that insulated liquid-oxygen tanks from desert heat has been

removed. Missile, automatically radioing information on conditions in space, will reach speed of 4,300 miles an hour during flight.



Racer Doubles for Plane to Test Retractable Parachute

This racing car is trying out a new air brake—for airplanes. The brake is a retractable parachute designed to slow fast-landing jet planes. To test it without the bother of actually flying a plane, British engineers released it when the car hit 140 m.p.h., then pulled it back in by a motor when the car had slowed to 55.





Beavers Air-Dropped to New Sites to Engineer New Dams

BEAVERS living in forests overcrowded with them, and amply supplied with dams, are being airlifted to new homes where more dams are needed. U.S. Forest Service men capture the animals (above left) and pack them in pairs in boxes so they can be dropped by parachute (above right) to colonize remote mountain areas. As the box

touches the ground, it springs open automatically and mama and papa beaver scamper off to found new settlements.

Beavers were formerly transported into the wilderness by pack horse, but on the long journey they often became overheated and died. Flown in, they arrive in good health and take the jump undisturbed.

Atomic Pram Totes Hot Toiler

WORKMEN leaving hot areas in a British atomic plant are not allowed to walk through the corridors. They might spread radioactive dust from their clothing. So they get ceremonious rides, like ancient kings, moving from place to place on a special cart hauled by another workman.

▶▶▶Auto components get a rough workout at GM's newest test station—it's on Pike's Peak. Engines, transmissions and carburetors are subjected to high-altitude and steep-grade checks.





X Rays Make Plastic Tough

At the sterilizer above are two plastic bottles. That's right, two. After sterilization at 250°, one bottle is just a blob. The other, previously bombarded by electrons from a million-volt X-ray machine, is not affected by the heat. General Electric plans to market such heat-resisting bottles soon, foresees plastic hot-water pipe.



Detector Knows Iron from Gold

Titis detector can tell one metal from another. It signals loudly when iron is present, decreases in tone when gold, silver or other metals are found. The Gardiner Electronics Co., 2018 N. Dayton St., Phoenix, Ariz., says it will locate gold nuggets in streambeds, coins in beach sand, and pipes, wires and electrical boxes in walls.

AUGUST 1954 91



Fortunes in Uranium

Along canyon rims and roadsides, by air, and in the depths of old ghost mines, U.S. prospectors again are striking it rich.

By Alden P. Armagnac

LADY rockhound hunting specimens in Arizona came upon several petrified trees. They had turned to rock of such a peculiar yellow color that she chipped off samples of it and took them to the state geologist. It was carnotite, an ore of uranium, and the logs contained 200 tons of the mineral worth a small fortune.

Another amateur rockhound, a Colorado high-school janitor, found an outcrop of uranium ore on the eastern slope of the Continental Divide near his home. Weekends and vacations, he shoveled away at it, until he had a carload to ship to a Government purchasing depot, Now the Atomic Energy Commission has declared his find an important one, miners are working for him to exploit it, and he's a janitor no longer.

A 34-year-old Utah prospector has sold \$2,500,000 of the dull black rock that his diamond drill struck while he was seeking canary-vellow carnotite ore. His black stuff was uraninite, the most prized of uranium ores-pitchblende is one variety of it-and one rarely found in this country.

Production Soars Under AEC Sour

By guaranteeing to buy uranium ore at generous prices for years to come, and by offering handsome bonuses for discovering it and starting new mines, the Atomic Energy Commission has spurred U.S. production. At the latest tally, more

MILLION-DOLLAR GRIN is worn by Charles A. Steen, 34-year-old geologist and prospector, after he hit uranium jackpot by discovering a fabulous uraninite lode near Moab, Utah. PETRIFIED LOGS of Colorado Plateau, like this one in mine, are rich in high-grade carnotite. Biggest may yield 100 tons apiece.

Photo from Engineering and Mining Journal







UP THERE AND DOWN HERE, in underground workings, Colorado Plateau miners find carnotite-ore pockets scattered through rock. This scene is in larger-than-average mine.

than 600 mines in this country were vielding uranium. U.S. output has outstripped Canada's, and it now ranks second only to that of the world's richest source, the Belgian Congo in Africa.

Anyone can get into the act. It's like the days of the forty-niners all over again. This time it's in modern dress-in an era of jeeps and planes, of neon signs and plastic-and-chromium trimming. But it's the same irresistible, age-old lure of fortunes in mineral treasure.

The uranium hunters' Klondike, the Colorado Plateau carnotite district, extends over western Colorado and parts of New Mexico, Arizona and Utah, This booming area's mesas, flat-topped hills of red and buff sandstone with rugged canyons between, are dotted with sagebrush and uranium workings.

If you see a hole burrowed into a canvon wall near a mesa top, a few timbers. perhaps a bit of rickety-looking track, that's a carnotite mine. If you expected big buildings, excavations and rock piles, you'd go right by one without knowing it.

Someone and his pal scrape together an air compressor and drill, picks and shovels, a one-ton ore car or just a

wheelbarrow, and they're in business. They push a filled ore car by hand to the mine entrance-or, if pickings have been good, they may treat themselves to a small mine locomotive. You can buy one powered by compressed air, seen in the picture on this month's cover, for the price of a car: \$1,420 and up.

Pocketfuls of Money

These are midget mines, and for good reason. Most of the ore deposits scattered through the sandstone are small pockets, of only a few hundred tons or less. But once in a while the deposits run to exceptional size. Fifteen have been discovered to date that contain more than 100,000 tons of carnotite ore apiece. Generally a lode of such size has a gross value of more than \$3,000,000.

"Rim-walking" prospectors checking surface rocks with Geiger counters, or just looking for the vellow color of carnotite outcrops, have still to search innumerable miles in outlying parts of the district. But in the 50-mile strip called the Uravan Mineral Belt, where the hunt has been most intensive, most new deposits are being found today by sinking drill holes from the mesa tops. Depending on how deep ore is struck, it's mined by removing the surface layer or by driving a tunnel inclined gently from the surface—or, below 200 feet, by sinking a vertical shaft. Horizontal tunnels bore into the more easily mined outcrops on the mesas' sides.

Pay Dirt for the Santa Fe

The Colorado carnotite deposits, long considered a geological rarity, now are known not to be unique. Recent discovery of similar ones in the Black Hills of South Dakota has opened a new uranium field. And a railroad has found itself the owner of a uranium mine because a Navajo Indian sheepherder, who had seen ore samples at a trading post, recognized carnotite in limestone rock along the Santa Fe right of way near Grants, N. M.

A curious variety, asphaltic carnotite, is being exploited at Temple Mountain, Utah. Ores containing both uranium and copper have turned up in southern Utah and Arizona.

Carnotite and other bright-hued deposits are "secondary" uranium minerals formed by weathering and chemical change from original deposits of "primary" uranium minerals, dissolved by ground waters and scattered afar. Much richer are deposits of primary uranium minerals like Africa's and Canada's black pitchblende. Some have been found in this country.

Pitchblende actually was the first uranium ore ever mined in the U.S., away back in 1871 at the Wood gold and silver mine in the Colorado Front Range. It went unrecognized and was thrown out on the dump, where a geologist found and identified it. From the following year to 1919, this and neighboring mines produced small quantities of pitchblende, perhaps 300 tons in all.

Ghost Mines Yield Again

Now U.S. geologists are combing more carefully the drifts and crosscuts of long-abandoned ghost mines of the Front Range, in addition to mines still working, for pitchblende—and finding it. Their reports contain such phrases as, "Uranium occurs as pitchblende in veinlets from 1/32 to 2 in, wide."

Fantastic as it may seem to big-mine operators, pitchblende is such precious stuff that a veinlet only one-eighth of an inch thick can be mined at a profit.

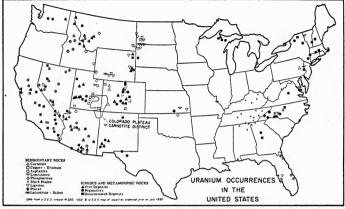
Literally colorful is the Marysvale district in Utah, lately the most consistent producer of pitchblende from U.S. vein deposits, with most ore coming from the Prospector and Freedom mines of the Vanadium Corporation of America. Here is a large-scale counterpart, experts point out, of the rainbow-colored orcs surrounding the famous Congo pitchblende veins (see color diagram on page 97). At Marysvale, in 1949, the first minable green and yellow secondary uranium minerals were discovered near the surface. Deeper probing turned up other bright-colored ones-and then, below 70 feet, brought geologists to the



THIS 15 THE WAY you stake a claim for uranium. Notice posted on tree gives ownership and claim's name—here, "U.S.V.C." for U. S. Vanadium Corp., and "Brazil" for name.

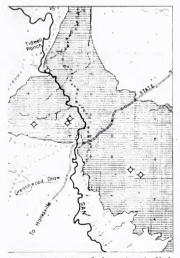


AFTER SURVEY and required "discovery cut" with a bulldozer, the prospector sets up corner posts to mark his claim's houndaries. A claim covers area of 600 by 1,500 feet.



HERE'S WHERE the uranium is in U. S., by recent official AEC map. Principal source has been four-state Colorado Plateau carnotite district. Important new ones are South

Dakota and New Mexico carnotite deposits, Utah and Colorado pitchblende veins and uraninite in Utah. In South, phosphate rock for fertilizer yields by-product uranium.



SIX LIKELY PLACES to find uranium in Utah are marked by four-spoked circles. Maps like this, based on aerial radioactivity surveys, are posted by AEC to aid prospectors.

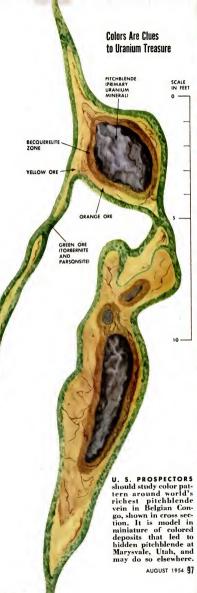
pitchblende. This color pattern may prove a guide to hidden, deep-lying pitchblende elsewhere, the experts say.

It remained for a young geologist too hard up to afford a Geiger counter, Charles A. Steen, to make the country's most sensational uranium strike. Under the broiling Utah sun southeast of Moab, one July day in 1952, he watched his rented diamond core drill bite into the rock. Then, less than halfway to his intended 200-foot depth, the rig broke. Down the hole went the lost tools and his last cent.

Automatically he gathered up the unpromising core samples of rock so far recovered, stowed them in his jeep and drove back toward town, crushed with disappointment. At a filling station on the way, Steen found a friend checking ore samples with a Geiger counter—and, though sure his own were worthless, tested them. When the counter went crazy, he knew he'd hit the jackpot.

His borehole had penetrated a 14-footthick bed of phenomenally high-grade uraninite ore, at 70 feet. Subsequent

[Continued on page 240]





CARNOTITE ORE in typical stockpile contains small proportion of carnotite, impregnating buff-colored sandstone. High-grade carnotite has bright yellow color (picture on cover).



AT COLORADO MILL, chemical treatment of ore extracts uranium in form of "yellow cake." Shipped in steel drums to the AEC, it will yield uranium metal for reactors and bombs.

BY-PRODUCT from same ore is vanadium, recovered here as "red cake." Miner is paid for both uranium and vanadium in his ore.

Color photos from U. S. Vanadium Company



How Man Put Light to Work

A CHANGE of expression means a change of head in Dollywood, film studio of Joop Geesink in Amsterdam. Holland. There, small, lifelike puppets

without strings have been making a stopmotion movie called "Light Through the Ages." The 10-minute film was created for GE to show throughout the U. S. in celebration of the 75th birthday, Oct. 21, of practical incandescent light.

Realistic dolls of plastic, wood and cloth, dressed expertly, were moved by hand and repeatedly photographed (right) as they played the scenes below.

Dutch puppets play historic scenes in stop-motion movie marking



AT FIRST TERRIFIED when lightning set a tree ablaze outside his cave, early man soon learned to utilize fire to light the cave.

TALLOW CANDLES lighted the pages on which medieval monks wrote and decorated important texts before the invention of printing. EGYPTIAN TORCHES consisted of flaming linen soaked with olive oil. Men burned oil for illumination for several thousand years.

WHALE-OIL LANTERNS illuminated the docks of young America. The discovery of petroleum in Pennsylvania in 1859 snuffed them out.





electric bulb's 75th birthday.



ROMAN LAMPS of bronze burned olive oil, too. They represented a considerable improvement in lighting fixtures, first made of stone.

YOUNG EDISON demonstrated the first successful incandescent light—carbonized cotton thread glowing in a vacuum—Oct. 21, 1879.





Heaven-Bent, a new guided missile designed and built by General Electric roars upward from its launching platform for an experimental flight at the Air Force Missile Test Center in Cape Canaveral, Fla.



First Color X-Ray, a shot of a mouse, was made by Dr. Ralph S. Mackay, University of California. He took three X-ray pictures at varying wave lengths. then projected them through three different color filters.

AUGUST 1954 99

The Truth About Your



Brakes

Can you count on them? Are they keeping up with power? What's Detroit doing about it?

By Frank Rowsome Jr.

NERGY-ABSORBING gadgets like auto brakes do not have the glamour of energy-producing gadgets like engines, but they are fully as important; running out of brakes tends to be more exciting than running out of gas.

"Accidents due to defective brakes," the Association of Casualty and Surety Companies reports, "have contributed to more than 40 percent of all mechanical-defect accidents." Insufficient or inferior fluid, worn linings, and worn master or wheel cylinders are the chief culprits.

But sudden, total brake failure is actually quite rare. Far more common is a gradual deterioration of stopping performance, built up over thousands of miles. Since it comes imperceptibly, it can sneak up on a driver: on a hard stop the pedal will come nearer the floor, but only a little nearer than it did last month.

A complicating factor is that expert drivers can be trapped by their own competency. With a combination of skill and good judgment, you may go thousands of miles without a crash stop—then, suddenly, the chips are down. That's a bad time to discover worn brakes.

What is Detroit doing about it?

Even though brake engineers have enough glittering equipment and Greek-letter mathematics to split an atom, brake work is largely done on a let's-try-it-and-see basis. Brake design is intricate, and a theoretical approach is hampered by technical mysteries (what is friction anyhow?) on which experts disagree.

There is also general Detroit agreement that you don't fool around with brakes. Styling spears, power-operated

How to Use Brakes



USE BRAKES SPARINGLY. Unnecessarily hard or frequent braking not only wastes gas, tires and brakes, but it adds to fatigue and is the mark of an unpolished driver.



PUMPING OR FANNING THE PEDAL (a rapid on-off movement) can help with directional control on a slippery surface, or when a pedal goes dangerously low.



IN A STOP FROM HIGH SPEEDS, it is preferable to build up the rate of deceleration as quickly as comfort permits, doing most braking while still traveling fast.



IF TRAPPED BY A TIGHT TURN, try to stay off the brake pedal. If the turn is going to make tire-to-road adhesion chancy, you can't afford to spend adhesion in braking.



MAKE A PRACTICE of using the brake pedal to test for possible slipperiness when you come to a different kind of road surface, or the weather changes.



GUARD AGAINST the tendency to grow so accustomed to your car's brakes that you allow them to become badly worn.

Brakes gulp energy even faster than today's engines produce it

CLIMB INTO A ZIPPY 1954 SEDAN, select a deserted stretch of highway, and belt the gas pedal. When you get up to 75 m.p.h., hit the brakes hard—just shy of a squawling crash stop. You'll get back to zero fast. Where it

took a 200-plus-hp, engine 20 seconds and 1,300 feet to accelerate you, the brakes do the opposite in less than five seconds and 275 feet. The energy they soak up then amounts to 500 or 550 horseponeer.

antennas, and even the seductive curves of your combustion chamber can be left for the brass and the sloganeers to tinker with. But nobody ever bucks for anything but the best possible brakes that the budget can provide.

What are the problems? A brake designer, in theory, can count on six inches or more of pedal travel and a peak pedal pressure of about 150 pounds. (Even Grandma, using her elderly knee as a kind of toggle, can push that hard.) But the competitive heat is on the brake designer to lighten the job. So he specifies a brake-shoe linkage that has a servo effect—one that uses a "wrapping" shoe that borrows energy from the car's momentum to do part of the work.

This is fine—a kind of poor man's power brake—but it brings its own headaches. One is the need to equalize wear among brake shoes; another is that brakes must obviously also stop a car from rolling backward; a third is that if you get too much self-actuation, the brakes may accidentally lock. A continuing problem with self-energizing brakes—which most

U.S. cars now use—is that the more "servo" you put in, the less constant it is.

But constancy is the prime brake virtue. To be truly safe, a brake should deliver a predictable, proportional response despite wide variations in speed, load, temperature, humidity, frequency of applications and a host of other variables. (You can see why the pros usually refer to a brake as "she" and use the term "morning sickness" to describe one common ailment. This is the snappish habit otherwise docile brakes have of pitching you on your snoot the first time you touch the pedal in the morning—a matter of moisture condensing inside and upsetting servo calculations.)

The harried designer has a packet of other problems. Where's he going to dispose of brake torque, a gigantic twisting force that, on a hard stop, wants to pretzel the suspension? What about forward weight transfer, which tries to nose-dive a fast-stopping car? How can he best divide up the work between front and rear brakes when a car will have enormous variations in load distribution?

At proving grounds and technical centers, they say:



• Brakes are not, on performance, lagging behind engines. They have had an increasingly mean job: heavier cars, higher average speeds, transmissions affording less engine braking. But they are holding their own. Stopping performance is demonstrably better than before the war.

- Power brakes are here to stay, having outlasted some sharp behind-the-scenes controversy.
- Disk brakes, although under study by many makers, are apparently not going to supplant drums in the near future. The best of them work well but they are too expensive.
- The fade problem—progressive failure of brakes during severe use—is being assailed from several directions, including special cooling and linings.
- Brake governors—clever little gadgets that unlock a sliding wheel to reduce swerve in crash stops—are being studied.

O то 75 м р.н.



1.300 FEET



275 FEET

20 seconds



SECONDS





How's he going to get big, cool-runing drums with small tire diameters? (Bigger drums wouldn't be an unalloyed blessing: more area and more leverage, at the cost of higher surface speeds and more unsprung weight.) And how's he going to design a hydraulic system that will withstand 1,500 pounds to the square inch, last indefinitely, never fail suddenly, and cost less than the competition's?

They love power. Brake engineers as well as lady drivers like power brakes; there's less need to sweat for a soft pedal, and tougher linings can be specified. They don't stop a car any faster, of course, but they make it easier to produce any given deceleration.

Standard equipment on some '54 cars and comparatively low-priced options on all others, modern power brakes are vacuum-operated boosters that multiply pedal input by three or more. A good deal of ingenuity has been spent in providing reactive feel, vacuum storage, and "fail-safe" performance.

Low-pedal power brakes-with total travel about that of the accelerator—let a driver swivel his foot on the heel between brake and gas. This is quick and easy, but also has provoked a sharp undercover fight on safety. Reducing pedal travel reduces leverage produced by the driver's foot, which is all right as long as boost is available.

Say the high-pedal advocates (notably the four Chrysler divisions): An engine killed at less than 20 m.p.h. on a winding downgrade may not be momentumstarted through an automatic or overdrive transmission. An inattentive driver -let's call her a dopey dame-may not know it, and may use up the vacuum reserve unconsciously. Then a sudden emergency, on a low-pedal car, may call for immensely high pedal pressures.

That there is some cogency to the point is suggested by Olds' use this year of a bigger vacuum tank, and by Buick's new optional electric vacuum pump. This writer has tried out both high- and low-pedal jobs with engine cut and vacuum reserve expended. In the high, effort is only a bit more than with unboosted brakes. On low-pedal cars you have to

What's the Quickest Way to Stop Your Car?

STRAIGHT CHAIK MARKS REMAIN STRAIGHT ON UNBRAKED WHEEL

STRAIGHT MARKS CURVE UNDER MODERATE BRAKING PART OF CONTACT AREA SLIDES UNDER ANY BRAKING TORQUE



FOOTPRINT*

ROLLING FRICTION

If you believe that locked wheels will pull a car down faster, you'll be backed by Ford engineers. If you pick braking-just-shy-of-sliding, you'll have many GM and Chrysler people in your camp.

Most automobile people have long cherished the notion that maximum braking comes when a wheel isn't quite dragged, maximum acceleration when it isn't quite spun. It is a plausible

notion. Ford's experiments, however (involving static friction coefficients, torque and other factors), suggest that it isn't true.

However the experts resolve the dispute, it is plainly an excellent idea not to rely on slid-.........

ing wheels to stop you.

SLIDING FRICTION-

tromp very hard indeed, Startlement is perhaps a big factor, which suggests the merit of running an occasional rehearsal.

Those wonderful disks. Prophets have long been hailing disk brakes as the coming thing. They do a fine job on heavy aircraft, have been widely touted as a major reason in Jaguar sportscar victories, and have done well on the heaviest Chryslers.

Disks-which work by pinching pressure on a disk turning in the same plane as the wheel-have big advantages. Unlike a drum, a disk won't distort under pressure. It won't expand with heat in a direction that reduces useful pedal travel. Counting both sides, it has a bigger "swept" area than a drum. And open, racing-type disks are about as perfectly ventilated as a brake can be.

The drawbacks are also considerable. If you expose the disks to grit and rain, you'll shortly get pitting and roughening of the disk surface, which is murder on lining life. (Car brakes, unlike racing jobs, must go thousands of miles without attention.) But if you enclose the disk in a housing, as Chrysler does, you go back to building ovens-enclosed containers with heat sources inside.

Moreover, by the time you get a disk brake smooth, self-adjusting, self-actuating, and all the rest, you end up with an intricate, costly mechanism.

Anatomy of fade. A brake is an ener-

gy converter that trades foot-pounds for calories. When you overfeed it energy, it produces too many calories, which generally means fade trouble. Fade is the alarming loss of stopping power that can occur when you hit the pedal hard and often, say, down a long mountain grade,

There's a distinction between pure fade and "loss of pedal." The latter, when your foot goes smack to the floor, may come from low fluid, wear, or drum expansion: but unless there is actual hydraulic failure, you can correct for it in a pinch by pumping the pedal back up. True fade is different: a heat-caused change in the coefficient of friction between lining and drum. You push like all get-out, and the pedal still has travel left, but you don't do much stopping.

The experts aren't sure how it happens. Some talk obscurely about monomolecular behavior. Others theorize that oily liquids used as a binder in linings come boiling onto the surface under intense heat. There's no question that extremely fade-resistant linings can be made; the difficulty is that you have to pay elsewhere in things like loss of smoothness, higher unit pressures, or a tendency to score drums,

The other avenue of attack is through cooling. This includes such measures as the electric blowers on the rear brakes of the Mexican-race Lincolns.

[Continued on page 232]

THEIR GOAL WAS IN SIGHT when Louisville's amateur astronomers reached this stage of the 20-year project. It consisted of making a wooden pattern for the cell that would hold their 20-inch mirror. Here was work at which those who had no talent for grinding mirrors could show their skill



Big-Time Telescope Built in Basement Amateur stargazers in Kentucky worked 20 years at their hobby.

THE biggest telescope in Kentucky is homemade. It cost less than \$1,000 to build and house. That makes it just about the least expensive big telescope in the world-in terms of money. In terms of effort, the story is quite different. It took 20 years of A SLIT IN THE DOME. actually a silo top whose peak was 14 feet above ground. was given a covering driven by motor.



THIS 20-INCH PYREX DISK became the telescope's mirror when it finally had been ground, polished and plated with a half-

ounce of silver. The three-inch hole in its center allows star reflections to come back through the mirror and into the eyepiece.

planning and fussy work, including 4,000 hours of glass grinding in a basement, to get the 20-incher ready to sweep the heavens.

You'll hear no complaints, though, from the mathematics professor, gas chemist, bridge engineer, machinery inspector, retired manufacturer, electrician, draftsman and machinist who did most of this work. After two decades of anticipation, each one of them, as a member of the Louisville Astronomical Society,

now happily owns a key to an observatory that he helped to build. There he can climb a six-foot ladder and gaze through an eight-foot tube at Venus or Mars or any other celestial resident to his heart's content.

Once the project, years ago, had progressed beyond the talking stage, the amateur group moved blithely into professional circles. They ordered a mirror from the Corning Glass Works, whose engineers had just poured and annealed



AN OLD WASHTUB in Dr. Walter L. Moore's basement workshop protected the delicate mirror from dirt between grinding sessions.



FINISHING A MODEL for a cast-aluminum ring, one of those required to mount the amateurs' telescope, which is of the open-tube type.



THE MAIN SUPPORT of the telescope followed this pattern, shown as it was being assembled by an Astronomical Society craftsman.



FRAME FOR A 20-INCH MIRROR, the cast-aluminum cell above was carefully measured and marked before being drilled for mounting.

the giant 200-inch mirror for the Mt. Palomar telescope in California. The 20-inch, 110-pound disk that they got for their money—only \$84.79—was poured according to the same formula as its 200-inch cousin.

When the mirror arrived, marks of the brick mold were still on it. The rough edges had to come off, and that started the years-long, piecemeal ordeal of grinding and polishing.

"We could have finished the job a lot

sooner if we had been better opticians," says Louis Aker, one of the group. "Three different times our mirror grinders found that they had ground hollows in the disk and had to start all over again."

When the mirror was ready, the amateur stargazers went to work on the observatory, a structure 17 feet in diameter, made of concrete blocks. Its aluminum dome, originally intended to top a silo, was fitted with rollers and a track in order to revolve.—George Laycock.



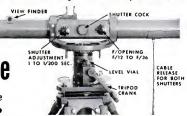
Police of Bern, Switzerland, take 3-D photos to settle dispute in

3-D Photos Fix Accident Blame

Camera eyes carried in police cars help tell the judge who was at fault in a traffic crash.

IN SWITZERLAND they don't argue about who was responsible in a traffic accident. That's because Swiss police cars carry a witness that can't lie or forget-a special camera that takes 3-D photos for judge and jury to see in case of a dispute.

Viewed through an inexpensive stereoscope, enlarged photographs give indisputable evidence of what happened. From the pictures, the police can plot the accident scene on maps that give such information as width and incline of roadway, skid



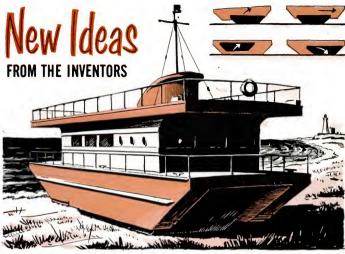
Controls of 3-D camera are on a tubular bar.

marks, distance and direction of travel before and after the impact.

The camera, made by the Wild Survey Instrument Co., has two lenses (really two complete cameras) mounted about four feet apart on a rigid tubular bar to give exaggerated stereo views. The device is mounted on a tripod with a head that can be leveled like a transit. When the scene of the accident has been centered through a view finder, the bar is raised on the tripod to take pictures from an unobstructed height.

Diagram below was plotted by Swiss police from photographs taken by stereoscopic camera. <u>errar kumpan Kotik terbekan peranat naman menangan perinak sa mpagan pinak tibat bi pinak angan kapan ber</u>





1 Boat to Walk or Float. A vessel that could step through marshes or over solid ground would never be landlocked by shallow channels or low tide. It could navigate unnavigable waters and "dock" itself on any

handy beach. This amphibious craft would have a central hull flanked by pontoonlike steppers. When it struck bottom, its outer shell would rise and thrust forward—or backward—in a kind of leapfrogging motion.



2 Rollers to Wipe Dipstick. Checking your oil would be a cleaner and easier job if you had this gadget under the hood. The bent spring wire could be clamped to any convenient part of the engine; it would support a pair of replaceable, felt-covered wiper rollers. Before checking oil level, you'd simply draw the dipstick between the rollers.



3 Hanger Magnets to Grip Clothes. Dresses and other light-fabric garments might hang straighter if they were pinned down by magnets. A flexible yoke would support a pair of magnets above the bar of this hanger, Attracted to iron inserts in the hanger, they'd grip the cloth and keep it from bunching up or slipping sideways.



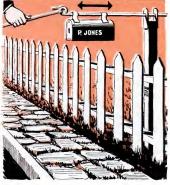
4 Oar Band to Free Rower's Hand. This two-part attachment would let a troller row with his wrist while holding his fishing rod in his hand. A ridged block fastened to a wrist strap would interlock with a grooved saddle that could be clamped to any oar. If the rower got a bite, he'd slide his arm to the side to free it from the oar.



5 Pen Nib to Filter Ink. Unlike either regular or ball-point pens, this new writing instrument would transfer ink to paper by filtering it through the pores of a special metal point. It is said that capillary action would keep the thick, pasty ink from leaking but permit it to flow when the point touched the paper.



6 Knee Grip to Steady Plate. To keep your picnic lunch from skating off your lap, you'd grip the fold-down rim of this paper plate between your knees. Intended for drive-in restaurants as well as for picnics and parties, the plate would be precut and creased so the user could easily bend down the legs as shown.



7 Box to Meet Postman Halfway. A mailman wouldn't have to get out of his car to reach an off-the-road box that was mounted on a sliding rod. He'd carry a long hook to pull and push the box. Slide-out boxes would be useful wherever sidewalks, muddy ditches, or snow banks might keep him from driving up close to the post.



8 Air to Hold up Tent Walls. When pumped up, this combination sleeping bag and tent would support itself without stakes, and the inflated bottom would serve as an air mattress. The walls and bottom would be formed as a single piece; the sides would bend upward and zipper together at top. Deflated, tent would fold into a compact pack.



9 Chain to "Remember" Your Key. This tuneful chain would have a cylinder and plunger between the key end and the part that hooks to your belt. If you should forget your ignition key when you leave your car, the plunger would pull out of the cylinder and whistle a reminder. The parts would separate before the tug could tear your belt.



10 Bubble to Shield Tractor Seat. A clear plastic bubble that would close like a clamshell around a tractor operator would protect him from wind, cold, dust and rain, but would not reduce visibility. The rear hemisphere of this plastic enclosure would

be fastened rigidly to the frame of a conventional tractor. The front half, shaped to fit over the engine hood, would be mounted on rails. An operator would slide the front section forward over the hood when he wanted to get in or out.

U. S. patents on these inventions have been granted to: 1. J. T. Tucker, Oxnard, Calif.; 2. P. L. McClaskey, Phoenixville, Pa.; 3. B. Weiss, Flushing, N. Y.; 4. P. Schaper, Chicago; 5. E. W. Rickmeyer, Prospect Heights, Ill.; 6. D. J. Olson, Minneapolis; 7. A. H. Kackak, Bristol, Conn.; 8. B. L. Kreuser, Denner; 9. G. H. Riviere, New Beris, La.: 10. G. P. Base, Idalou, Tex.

Plastic Kaiser Shows Its Sporty Ways

A seductive murmur from the exhaust is the tip-off to an acceleration and cornering performance worth experiencing.



With its modest 90 hp, the new Kaiser Darrin sports car gets under way surprisingly fast.

By Wilbur Shaw

TT'S the next thing to blasphemy in the beret set to taint the tires of a sports car by setting them down on a saucer race track, but to give the Kaiser Darrin 161 a whirl. I had one deposited for me the other day at the Indianapolis Motor Speedway. It was the handlest place I could think of where I could open it up without greetings from a traffic cop.

Willys, now a subsidiary of Kaiser and the actual manufacturer of the Darrin, has attempted no legerdemain with this car. It is powered with the company's 90-horsepower F-head engine, and has a standard three-speed transmission backed up with an overdrive unit. Its axle ratio of 4.55 is designed more for acceleration than high speed.

Sports-car drivers want a car that accelerates well. has a commendable top speed and, above all, "corners" well.

The Kaiser Darrin was entirely tractable in hard right-angle turns on dry pavement at an indicated 55 miles an hour. It began "breaking loose" on all four wheels just beyond that speed. This was with the rear-wheel "dig" provided only by high gear. It was here, in pulling out, that the axle ratio counted. On rough footing the car began coming un-

112 POPULAR SCIENCE



A nice weight balance between the axles keeps the side sway in cornering to a minimum.

stuck from the road about 10 miles an hour earlier.

Before seeing what the car would do flat out, I checked the speedometer. Its error was about normal—3.7 miles an hour on the high side at an indicated 60 m.p.h., and just over six m.p.h. at 90. With a passenger aboard, top speed in third gear was an indicated 90. At that pace the tachometer in the instrument cluster registered 5,200 r.p.m. Top speed in overdrive was only slightly better—95.

Top speed in second gear was an indicated 70 m.p.h., with a tach reading of 5,800, and that in first gear 40 m.p.h.,

with the tach at 6,500. The little F-head engine revved up amazingly high.

All speeds were averages of runs with and against the wind.

Here are the average acceleration times:

Zero to 30 m.p.h., using first gear only: three seconds.

Zero to 40, using two gears: 7.5 seconds.

Zero to 50, using three gears: 11 seconds.

Zero to 60, using three gears: 14.7 seconds.

Time to the quarter-mile from a standing start: 19½ seconds.

Measures Up to European Sports Cars

Esthetically, Darrin has done himself proud in the 161. (The designation is taken from the piston displacement.) The car can be stacked up against anything Europe has to offer in sports cars.

The Kaiser Darrin is the first massproduction U. S. sports car of this era. It's being made by Willys, along with Willys, Kaiser and Jeep, because the Kaiser people have fused all their automotive interests under the Willys manufacturing name. The "Darrin" comes from Howard A. Darrin, the custom-car designer who styled the job.

The car I drove was one of only 2,000 that Willys will make as a first and possibly only batch of plastic-and-fiber auto-



DUE TO THICKNESS of material necessary for strength, plastic bodies aren't so much lighter than steel ones. The Darrin's weighs 300 pounds. Total weight is 2,175.







RIGHT HALF OF DASH is covered by a crash pad. All the trim, including that on the seats and folding top, is of embossed plastic cloth.

REAR DECK LID is split between two compartments—one for the top when lowered, the other for luggage. Only two molds are used to form main body structure.

TRICK SLIDING DOOR disappears into the fender when open but closes flush with the body metal. The frame is a modified Henry J's.

mobiles. When they have been manufactured and sold—at \$3,668 a copy—the company will stop and look at the market. Chevrolet and Ford, the only other U. S. companies making production-line sports cars, are being equally cautious.

The prices on these cars are high not only because relatively few are being made, but also because plastic bodies are expensive to manufacture. Until they learn a faster way to do it, bury the myth that plastic cars can be turned out of molds as rapidly as cupcakes.

It's no great chore to mold the Darrin body, though it does require more manhours than a steel body. The plastic is laced with fibers, in a steel or aluminum mold, and forced into shape like a felt hat, under heat and pressure. But then the problems start. Plastic pieces have to be cemented together, often bolted.

Finishing problems are complex. As the stuff comes from the mold, it has imperfections. That requires patching, and the plastic requires time to cure.

Slow "Crumple Rate" Means Safety

Yet the stuff must have a terrific capacity for absorbing impact stresses. In one instance a Darrin unexpectedly encountered a truck at a blind intersection at 40 miles an hour. The car wasn't much to look at after the dust settled, but the driver walked away unscathed. He was saved by what engineers know as the slow "crumple rate" of the body material.

Plastic bodies are also excellent sound dampers. They filter out extraneous noises. That's one reason why the seductive tailpipe music of the Kaiser Darrin comes through so clearly, as deep-toned as any sports-car lover could ask. END

FACTS ON KAISER DARRIN 161

Model: sports car.

Engine: 6-cyl., F-head in-line; 90 hp. at 4,200 r,p.m.; compression ratio, 7,6:1; piston displacement, 161 cu. m.; piston travel (in feet per car mile at 20 m,p.h.), 2,101; bore and stroke, 3,125" by 3.5"; crankshaft bearing surface, 30,14 sq. in.; torque, 135 lb.-ft, at 1,600 r,p.m.

Weight: 2,175 lb. (without gas and oil); per hp., 24.1 lb.

Transmission: 3-speed manual shift; rear-axle ratio with overdrive, 4.55:1.

Steering ratio: 24:1; radius of turning circle, 17%.

Effective brake-lining area: 176 sq. in.

Springs: front, coil; rear, semi-elliptic.

Outside dimensions: height, to highest bow of top 50.8", to base of windshield 36"; over-all length with bumpers and guards, 184"; width, 67.5"; wheelbase, 100"; overhang, front 35", rear 49"; tread, front and rear, 54".

Inside dimensions: seat-cushion widths (total), 50.6"; leg room, 46.8"; headroom, 35.6"; seat height, 9.8"; vertical distance, steering wheel to seat cushion, 5.2"; seat adjustment, horizontal 5", vertical 0".

Tire size: 5.90 by 15.

Price: \$3,668, Toledo, Ohio.

Racer Takes Speed Trials Lying Down

THE Flying Deck Chair is what they call this superstreamlined motorcycle now trying for speed records in Germany. It is so low that the driverdesigner—a bearded six-footer named Gustav Adolf Baum—pilots it while lying flat on his back.





New Aircraft Cannon Shoots Like Six-Gun

THEY'VE modernized the old six-shooter into the fastest automatic weapon U.S. forces now have. That's the new M-39, shown at left blasting away on a Ford test range. It uses the revolver principle to fire 20-mm. shells. Developed from a German design, the gun was tested in combat in Korea. It is credited with destroying seven MIGs.

Water-Cooled Plastic Pillow Has Notches for Your Nose

Before inflating this plastic pillow, you pour in some water. By conducting heat away from the body, the pillow cools the fevered brow on hot nights or soothes an aching head.

The odd notches cradle your head and let you breathe in any position. Better Sleep Co., New Providence, N.J., makes it.

Southpaw Can Wind This Watch

A LEFT-HANDED watch is no gag any more. Southpaws can now get wrist watches with the stem at nine o'clock instead of



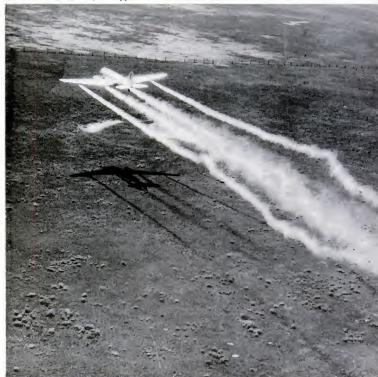
three, so that they can be worn on the right and wound from the left. They are sweep-second Hamiltons with faces rotated a half turn.



AUGUST 1954 115

Science Licks the Grasshoppers

Death for 500,000,000 grasshoppers in 15 minutes descends in an aldrin mist from a DC-3.





Many-tentacled spraying machines seek out and kill the marauding insects in small fields.

Victory over an ancient enemy now seems assured, as planes and machines attack with new, deadly chemicals.

By B. F. Sylvester

ONE of mankind's oldest foes is launching a savage attack on the western two-thirds of the U.S. this month.

Grasshopper hordes for weeks have been gathering in fence rows, along weedy roadsides, in ditch banks and under the surface of waste and idle lands.

Their campaign plans are known. Primary targets for this year are central New Mexico, southern Colorado, northern Wyoming, eastern Utah, southern Oregon and central Idaho. Secondary targets include other parts of Colorado, New Mexico, Oregon and Utah, plus Arizona, Nevada, Montana, Nebraska, Wisconsin and single fields in Missouri. Skirmishes are

scheduled, in all, for some 22 states. But the grasshoppers are in for a staggering surprise.

This year, armed by science, the U.S. is ready for them with new weapons that will smite the hoppers on the ground and blast them from the skies. We have

chemicals that to the insect world are the equal of H-bombs. Furthermore, we have the means to deliver them to targets that are already pinpointed, down to the last farm in Iowa and the least sus-

pected mountain slope in Colorado. Every county agent in the target states has a map showing where the egg beds are. So does every farmer who has asked for one.

Thus victory looms in one of the longest wars the world has ever known.

Even before men began writing history, grasshoppers were periodically stripping the land, forcing grazing animals to hunt grass elsewhere and carnivorous animals to follow the fleeing rabbits, mice, squirrels and birds. The records of ancient Greece, Rome China and Israel contain

many a grim account of grasshopper

"The land is as the Carden of Eden before them, and behind them a desolate wildern ss, yea, and nothing shall escape them," mourned the Prophet Joel. The American Indians suffered, too:

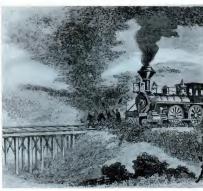


THE FACE OF THE FOE looks smug, perhaps because the battle went his way so long.

AUGUST 1954 117



Scenes of historic defeats in the Grasshopper War



CLOUDS OF HOPPERS attacked the peoples of Biblical times (left, above), leaving helpless tribes of men to starve and die.

years after it happened, an old chief told of a migration of grasshoppers that drove his tribe out of northwest Iowa in 1833 and left the countryside as black as if it had been swept by a prairie fire.

Destruction from the Sky

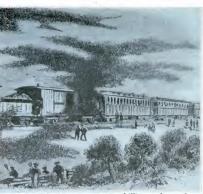
In July, 1874, a fantastic swarm of the insects-their wings grown as much as a half-inch longer than normal, their neryous systems stimulated by a mysterious impulse that periodically urges them to get up and go—dimmed the daylight over Colorado, Nebraska, Kansas and western Iowa. One flight was 300 miles long, 100. miles wide and a half-mile high, and was estimated to contain more than 120,-000,000,000 grasshoppers. The noise of their wings sounded "like a rushing storm." They dropped into the fields and ate every green thing. They devoured potato vines and followed them into the ground for the potatoes.

A farmer's wife had started for town in her wagon with tubs of fresh butter, covered with towels. A great cloud of the insects appeared in the sky. The frightened horses balked. The cloud descended, attacked the wagon and ate the towels off the butter. The woman finally managed to whip her team into frantic action and fled for home, where she tried to save her cabbages by covering them with old clothing. The insects ate the garments and even chewed up the shades on the farmhouse windows. Weather-beaten buildings soon looked as if they were made of new lumber. Green corn was bent to the ground by the weight of the grasshoppers by day. Branches in the freetops bent and broke under them at night.

The Futile Flood

In the wake of this historic attack, a soothing flood of inventions intended to prevent its recurrence poured into the farm states: the Hetzel Burning Machine, the Drum Locust Crusher, the Atwood Sulphur Fume Machine, the King Suction Machine, the Canfield Pan, the Anderson Coal Oil Contrivance, Mr. Thompson's Net, and others, all equally ineffective.

The hopper 'dozer came out about the same time. Drawn over the fields, it collected hoppers by the hundredweight to be sacked up for hog feed.



TRIUMPHANT IN DEATH, billions of grasshoppers that scourged four great U.S. farm states in 1874 even halted trains with their bodies.



SWATTING THE PESTS, a tactic that has proved futile for at least 4,000 years, was still this Nebraska farmer's only resort in 1876.

Poison bait, introduced in 1885, went west by the carload. But not until the last three years has science armed farmers with means effective enough to turn the tide of battle. Even now, along a belt stretching from Africa to India, grasshoppers threaten the food supply of one-fifth of the world's population. Under the Point Four Program, the U.S. is helping to fight the greedy insects on that distant front.

Today's weapons are chlorinated hydrocarbons, poisons of both the contact and internal varieties. DDT was not effective against grasshoppers. They ate it with relish. They began to get a disagreeable and fatal mouthful, though, when the chemists followed it up with hexachlorocyclohexane and then chlordane. After these came toxaphene, heptachlor and aldrin (its chemical name is two lines long).

Aldrin is so powerful that two ounces of it will kill virtually all the grasshoppers on an acre of land and any others that enter that territory for a week afterwards.

Newer and still more terrible, with an even longer chemical name, is dieldrin,

a half-ounce of which will do as much damage to grasshoppers as two ounces of aldrin.

This year, as the grasshoppers take wing, American farmers are able to mobilize 5,000 planes against them. Government DC-3s will smash the bases of potential insect flights. Ranchers will hire aircraft like the B-17 owned by two Nebraska brothers. It carries 12 tons of chemicals and kills the grasshoppers on 3,000 acres—a billion and a half, in a heavy attack—in 40 minutes.

Victory in Sight

On foot or from jcep or truck, the typical Iowa farmer can spray the hatching beds on his land in 20 minutes. If some of the young insects escape to move into his crops, he can spray 200 acres from a small plane in an hour. When insetsed areas cover 5,000 acres or more, state leaders in the battle will organize large control units, their cost to be shared by the U.S., the state and the individual farmers.

"I think," Dr. H. M. Harris, Iowa state entomologist, confidently declares, "that the grasshopper is licked." END

No Deposit or Depositor Too Small for This Bank

ALL a member of the lollipop set in Geneva, Ill., has to do nowadays to see what's going on down at the First National Bank is step onto a red spot in front of window No. 5 and wave the long green stuff.

From then on it's just click, swish, and a youngster is standing as tall as daddy, pushing his (or her) savings over the counter.

The secret is that red spot on the floor. It is a small elevator, controlled by teller No. 5 and powered hydraulically by machinery in the basement. A local firm made it from farm-equipment parts. It has a telescoping steel shroud—like a collapsible drinking cup—to make sure tiny toes aren't squashed.







The nurse above is applying a new tubular bandage, peeling it in layers from a cagelike contraption to fit it over the patient's head. The English maker claims that Tubegauze can be applied to various parts of the body in seconds.



Hot Metal Studied from Afar

The microscope goes to the specimen when it's a piece of "hot" metal. At Hanford, the radioactive sample is inside the cell above. An arc lamp outside (right) lights it, and a microscope, also outside (left), views it through a window.

170 POPULAR SCIENCE





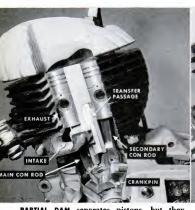
Fire Truck Is Ambulance, Too

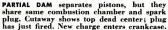
In Menlo Park, N. J., a two-man fire engine that can also serve as police car or ambulance investigates a blaze before the fire fighters make an all-out dash. Hoses coiled under the running boards pump 200 gallons a minute from built-in tanks or from hydrants. A hose above the rear bumper (upper right) pumps foam. Two bunk beds with space between for a stretcher let the truck double as an ambulance (right). Resuscitators, oxygen tanks and other gear (above) are stored in the cab. The Christopher Co., NYC, makes the FAPA truck.





Two Pistons in One Cylinder Power Imported Cycle







GAS FLOW at bottom dead center helps show how this two-cycle engine gains efficiency: burned gases are swept out progressively, without need for usual deflector pistons.



BABY BROTHER is this 5.1-hp., single-piston job that gives over 100 miles a gallon. A squirrel-cage blower cools it.

Ingenious engine in this small mail-order machine packs unusual punch for its size.

ANY day now you can get a motorcycle by mail and buzz across state on two or three gallons of gas.

Three new Austrian lightweights are in Sears, Roebuck's stores and catalogues this season, two in the 175-cubic-centimeter class, weighing 256 pounds dry, and a third in the 125-cc. bracket at 147.7 pounds. They are made by Steyr-Daimler-Puch, Austrian motorcycle builders, but Sears would prefer that you call them just plain Puch, pronounced pooch.

The bigger cycle, in either standard or de luxe trappings, will whisk you along at nearly 60 m.p.h., burn only one gallon every 86 miles, and take both you and

a passenger up a 30-percent grade.

The muscle for all this comes from a 10.3-hp. double-piston engine coupled to a four-speed, sliding-

122 POPULAR SCIENCE

gear transmission. Its pistons work in two bores, joined at the top, that share a common finned cylinder. The intake ports feed one bore and the exhaust leads off from the other. The pistons, linked to the same crankpin, have identical strokes, but are connected so that one leads the other during part of the cycle. This provides unusually efficient scavenging of the exhaust gases. It delivers a high 0.95 horsepower for each cubic inch of displacement, almost double that of many auto engines.

Telescoping springs, oil-dampened, suspend both 16-inch wheels. Each half of the front suspension consists of a long helical spring plus an oil cylinder working through one set of damper valves. The rear fork, consisting of two shock absorbers, is a free-swinging pillar bolted to the cycle's strutless, sheet-steel frame. Almost half the rear fender is an integral part

of this canopy structure.

Dragging all three machines down to fast stops are oversized automotive-type brakes, finned for cooling, and applied by handle-bar grips plus foot pedals.

Sears decided to sell these small motorcycles because a motor scooter announced last year proved unexpectedly popular. The new machines will be serviced through the firm's scooter outlets. Delivered prices range from about \$300 to \$400.—Kenneth Wulie.



MAIN ROD, left, carries pivot for other. Both pistons have identical stroke but travel at different rates of speed.

To the casual eye, the new motorcycle looks like a conventional single of European design-





Egg-Crate Pads Quiet Radio Studio

EGG-CRATE separators line the broadcasting room at the high school in Boone, N.C. Science teachers helped by students stuck 760 moldedpaper pads to walls and ceilings, then anchored them with tacks. The local radio station's engineer says the unusual acoustic treatment gives the room broadcast quality equal to that of a big station. The school studio hooks up with station WTAR in Boone.

Educated Chickens Live in Solar House

THIS window-wall house is strictly for the birds. Facing south at Penn State's experimental farm, its Thermopane windows keep poultry warmer in winter, cooler in summer. An overhanging sunshade (shown extended) keeps direct rays from the double panes in hot weather.





This Furniture Grows Taller as Junior's Legs Grow Longer

THE combination desk and chest above grows with your child. To raise the level of the writing surface, you just pull out the telescoping iron legs and reset the locking pins (right, above). Three dresser drawers

at one end of the desk are topped with a cabinet with removable shelves and a builtin clothes rod. A magazine rack forms the other pedestal. The Darbylite Corp., 467 Troutman St., Brooklyn, N.Y., is the maker.

British Fire Fighters Use Gas-Turbine Pump

Two men can cart this gas turbine around a plant for use as an engine or a pump. It needs no water, little lubricating oil, and is far from choosy about its fuel. It will run on natural gas, coal gas, sewage gas, gas from a blast furnace, as well as kerosene or gasoline.

Operating as a water pump, it can deliver 500 gallons a minute at 100 pounds' pressure. The Rover Co. of Coventry, England, maker of one of the first gas-turbine automobiles, is the designer.

▶▶►The kids couldn't be left home with Mama during a recent scientific meeting in Washington—it was the annual convention of the Society of Women Engineers. The children came along and played in a hotel nursery while their mothers met in rooms nearby, glancing in occasionally to check on their offspring.







Twin Trailers Link Up to Make a 100-Seat Auditorium on Wheels

When its merchandising men tour the country, one company now sends along a showroom aboard two trailers that open and unfold to make a big auditorium. The facing trailer sides swing out and lock to

form an interior that seats 100 persons. Tucked in corners and on walls are a projection booth, three movie screens, a loudspeaker system and spotlights. Boyertown trailers make up the Armstrong motorcade.

I'd Like to see them make...



GOVERNMENT POSTCARDS printed in long strips and perforated so they could be torn apart for mailing. Typing notices would be quicker.—Mrs. Joyce Mosby, Darby, Pa.



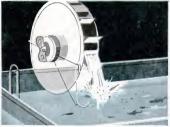
CANNED GASOLINE, sold in sealed gallon tins like antifreeze. Two or three could be carried safely in a car trunk for emergency use.—Frederic Carroll, Dallas.



A CASH REGISTER with a special key that would ring up NO SALE and at the same time set off a burglar alarm at a protective agency.—Murray Sidlin. Baltimore.



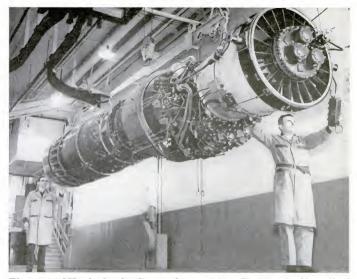
A DOUBLE-DECKER WHEELBARROW. The lower deck could be a shallow tray or a rack for tools, leaving the upper deck clear for materials.—Robert Chambers, Hewitt, N.J.



AN AQUARIUM FISH FEEDER that would do a catering job when you were on vacation. A bucket wheel with timer could dump food at preset hours.—P. Hoff, McKees Rocks, Pa.

Everyone has his own pet idea of a gadget that he would like to see in general use. The five ideas illustrated above were suggested by Popular Science Monthly readers. What

is yours? We will pay \$5 for each one published. Please use government postcards only. Write name and address clearly. Contributions cannot be acknowledged or returned.



Elongated Turbojet for Record-Breaking Fighter Is Unveiled

This long hunk of machinery is what sped the F-100 Super Sabre to a world speed record of 755 m.p.h. It is the J-57 turbojet, shown in one of the first photos released. The Pratt & Whitney power plant provides added power from its afterburner, an exhaust extension that can burn extra fuel when the pilot needs a boost in thrust.



L. A. Ready with Radio Trailers

Los anceles has three of these trailermounted communications centers for civil defense. They tie in with 150 radio cars, 100 walkie-talkies and 60 fixed bases. A "pup trailer" hauls a generator to power equipment in the big Fruehauf trailers.

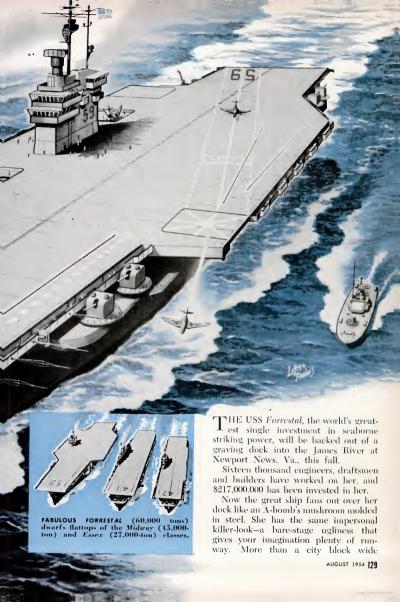


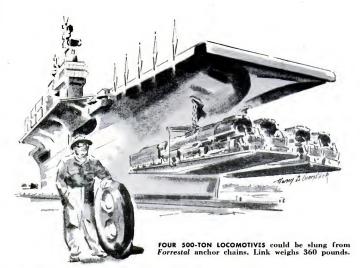
Truck Makes It Rain-a Little

The rainmaking truck above helps show which kinds of pasture will soak up rain the best. The cylindrical structure sprinkles two-foot patches of land so that Department of Agriculture scientists can compare different types of soil and grass.

AUGUST 1954 177







(252 feet at her flight deck) and 1,039 feet long, she is only seven feet shorter than the Chrysler Building is high.

Picture 100 Santa Marias moored bowsprit-to-sternpost and portside-to-starboard in the form of an elongated cross. Remove the Forrestal's control island and you could stow the lot of them aboard her flying deck.



Or stand on the edge of that floating airfield and look down. The floor of Graving Dock 12 is almost a hundred feet below you. But you'd never guess it. This huge concrete basin, which could wrap up such luxury liners as the *United States* with ease, is now blanked out by a hull that's busting out all over.

Cranes Trapped by Ship's Bulk

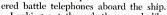
They had to clear Dock 11, beside her, to make way for the sponsons that support her flight deck. And the big traveling cranes that lifted 80-ton prefab assemblies aboard for welding are now trapped at the land end of their own handiwork. Crawler-cranes on the Forrestal herself must handle the controlisland units.

That island will be five decks high. With its stubby, hinged masts raised, it would tower 60 feet above the underflooring of the Brooklyn Bridge. A full-scale mock-up of each deck was roughed

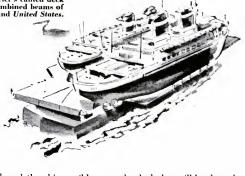
CAPE HORN DETOUR awaits Forrestal—its flight deck would span Panama Canal's twin locks.

OVER-ALL WIDTH of the carrier's canted deck is 58 feet more than the combined beams of the luxury liners America and United States.

out in the shipyard's joiner shop before cutting torches went to work on girders and sheet steel. Except for soundproofing, these mock-ups are complete, down to the last simulated intercom phone. An unimportant detail? Not when you're plotting cable for 400 dial sets and 1,900 sound-pow-



Looking out through the pagoda-like windows of the primary flight-control mock-up, you can almost trace the blur of A3Ds streaking down the four long



ribbons on the deck that will be the only visible sign of the Forrestal's steam catapults.

The Navy is coy about those "cats." Nobody's saying how the grooves are buttoned up to prevent steam leakage, for instance. But they are tried and proven rigs, able to whip the biggest carrier-based attack planes into the blue-up-yonder with a bomb load equal to the whole weight of a Navy plane in 1942.

Steel Decks for Fire-Breathing Jets

There's no such hush-hush about the functional design of the deck. It is made completely of steel. The fir originally used on U.S. carrier decks was better in some ways—more resilient and less slippery. But neither fir nor experi-

COMING UP: two small suburban lots, complete with homes, driveways, landscaping. Each of four airplane lifts could hold them. mental teakwood could take the hot breath of jet afterburners. The Forrestal's "tin roof" can. What's more, it will turn a kamikaze into the kind of briquette you can sweep up with a broom.

The carrier's amazing overhang is the direct result of the Navy's success with a canted deck on the flattop Antietam. In the past, an inbound plane that had lost its flying speed and missed the arresting gear on the aftersection of the

deck, plowed into a protective barrier if other planes were parked up forward.

Now that hazard is gone. They've widened the mid-section of the Forrestal's deck, and set her landing strip on a 10.5-degree diagonal. Thus a plane whose hook fails to engage any of the six hydraulically cushioned pend-(cables) strung across the runway will have a clear track over the portside of the ship and out to sea again, where it can square off for another trv.

The canted deck has other advantages. The old axial, or center-line

runway is still in business up front, offering what amounts to a completely independent airstrip. With catapults on both runways, the Forrestal will be able to toss her big jets aloft with the dexterity of a juggler, cutting the launching time for her squadrons in half. Or she can. when necessary, launch one flight and recover another at the same time.

Dumb-Waiters Will Serve Up Planes

The platform overhang also puts her four big aircraft elevators where they belong—out on the edge of the deck—not in the middle of her runways. These oversize dumb-waiters will shuttle between the platform and three 25-foothigh hangar bays on the deck below it.

The huge proportions of the bavsyou could put five basketball courts in anv one of them-are typical of the Forrestal's dimensions.

Her 3.500 crewmen will use nearly twice as much water as the eight big boilers that feed her main turbines. To supply both needs, her water tanks must store nearly 400,000 gallons. Half of it will pass through her distillers, daily,

Although one man can operate all of the control devices in each of her machinery rooms, the Forrestal's power plants are the largest ever put in a ship. To carry 200,000 horsepower from the turbines back to the screws, machinists at Newport News turned world's biggest the shafts. The longest of the lot has a reach of 400 feet. Each of the five-bladed bronze propellers is 22 feet in diameter. They will fan the Forrestal along at better than 30 knots.

Your guess is as good as any layman's when it comes to speculating on her secret weapons

and special equipment. At Newport News they'll only tell you what your own eves can see-that turrets for fiveinch guns are not yet outmoded.

Those who say that the H-bomb has written "finis" to big ships like the Forrestal like to use the phrase "too many eggs in one basket."

The men who designed the Forrestal. and two sister ships to follow (the Saratoga and CVA-61, as yet unnamed) have a pat answer.

"There'll be plenty of eggs," they agree. "The kind that a basket like the Forrestal may be able to protect and deliver better than a land-based setting hen." END



ENOUGH AIR-CONDITIONING EQUIP-MENT for 21/2 Empire State Buildings will blast tropic heat from crew quarters and most working space for comfort aboard the Forrestal.



Safety Belt Stops Tractor

IF THIS farmer falls off his tractor—a common, often fatal accident—he won't get plowed up. His fall will yank out of his belt a plug wired to the ignition, killing the engine and stopping the tractor. The Dooley Co. of Moline, Ill., manufactures the safety belt.



Dairymaid Milks from Swivel Chair

MILKING 30 cows an hour without moving is easy for this dairymaid. The cows walk around her while she swivels about in the pit to milk, clean or feed them as they move along. Hervey Research Development Corp., Geneva, Ill., makes the equipment.



Gigantic Eggbeater Harrows Soil

GIANT rotating wheels dig slanting teeth into the soil to harrow and level fields at the E. S. Thompson ranch at Strathmore, Calif. The teeth, welded to the tubular framework, make the tool rotate as it moves forward.

Hens Get Quick Snack from Hopper on Jeep

SCOTT PEACOCK of Dinuba, Calif., doles out meals from a jeep-mounted hopper to feed 4,500 chickens in 4,500 cages in less than a half-hour. A gasoline-powered auger pushes feed across the bin and a paddle elevator lifts it to a flow spout. A strap on the driver's leg controls a clutch that regulates flow to the feed troughs.





Slot Machine Rents Cart as Robot Redcap

By DROPPING a quarter in a slot, this young lady gets a baggage cart for the hike from train to taxi. At the station exit she'll park the cart in another rack and get a refund of 10 cents.

Two railroads are trying out the selfservice carts to supplement redcaps at Boston's South Station and at Penn Station in Pittsburgh.

Car Skids on Purpose to Make Roads Better

That fifth wheel helps British engineers measure skids while their car goes straight and true. The extra wheel is simply mounted at an angle, so that it is always skidding. It is used in experiments on skid-resisting road surfaces.





Tin-Can Phonograph Sells Oil

NEXT time you stop for gas you may be handed a talking can to hold while you wait. A tiny phonograph run on flashlight batteries, it is set off by a button and sounds off with a sales pitch for Permalube oil through a speaker in the bottom.



HERE's a squeezed-down model of the camera that prints its own film as you shoot, Coat-pocket size, the new Polaroid makes eight 24-by-35-inch pictures from a roll that costs \$1.19. The camera costs about \$70, the clip-on flash gun \$13.

134 POPULAR SCIENCE

Let's Put Some Science in Science-Fiction

Well-known science writer prods modern cosmic yarn-spinners in the seats of their space suits with some pointed pointers.

By John Lear

BESPECTACLED small-fry inhabitant of a daily newspap-

er comic strip recently appeared in print with his head embubbled in a space helmet and a ray gun clutched in his hand.

"Seen any bad men in th' gulch today?" he inquired of a female caricature. "I aims to put law and order in these here parts!"

"You're mixed up, Stuart," the gal retorted. "You're dressed like a space-man, but you talk like a Westerner!"

The self-appointed spokesman of order stiffened his neck. "It so happens, ma'am," he cried, waving his pistol, "that I'm from out yonder in WEST MARS!"

The cartoonist who sketched that episode must be a reader of science-fiction. Certainly he achieved, in a few deft strokes, the most succinct expression I have seen or heard of the state of literary schizophrenia in which SF writing is bogged today.

On TV, Captain Video's space rangers amuse themselves, while riding rockets between the planets, by dialing movies of the Old West on their remote carrier beams. Perhaps this unscientific



JOHN LEAR, the writer of this article, holds four top awards for excellence as a science reporter: the Sigma Delta Chi Award for distinguished public service, the Headliner's

Award, the Westinghouse Award of the American Association for the Advancement of Science, and the Albert Lasker Award for distinguished writing in medical journalism.



sandwich of space-time may be excused on the ground that the earthbound watchers of the show are kids. But what about the following supposedly grownup book review in *The New York Times*? I quote verbatim:

The Earth of the far future is plagued with many problems; what to do about its conquerors, the "Spacers," descendants of the men who settled the stars; where to employ people thrown out of work by robots; why mankind prefers to live in a few gigantic megalopoles; and how to discover the murderer of an eminent Spacer. It is with this last problem that Lije Bailey, detective, is concerned. If he fails, he loses his rating, an almost-fatal misfortune in his overcrowded world. Moreover, he must cooperate with a robot Spacer detective while solving the crime. Lije learns more than the identity of the murderer: he learns how Earth can save

Is Lije Bailey very likely to make such a sweeping discovery while chasing a murderer? Does the writer who concocted such a plot show any respect for the scientific method of inquiry? How in the name of all the galaxies can any logical brain misuse the word "science" by calling Lije's Hollywood nightmare science-fiction?

SF Editors Repelled by Own Vacuum

I would enjoy, and I am sure most readers of POPULAR SCIENCE MONTHLY would enjoy, fiction bearing some relation to science as it is practiced on Earth. Creative literature is, after all, only an imitation of life. Its reason for existence is to mirror man's accomplishments, hopes and fears. But the mirror of science-fiction today is rapidly losing its quicksilver. From its barren glass the sterile emptiness of space stares so darkly that even the editors of SF magazines are repelled. H. L. Gold, of Galaxy, wrote a double-header editorial in his February and March 1954 issues to this effect:

"Lock, fellows! It may not be nec-



celestial detectives make a rather weird team

essary to go out to the stars just yet to find living space for our excess populations. There's a lot of room left right down here on the Amazon river."

The Moon-Mars-and-Venus rocket jockeys will argue, of course, that people ought to know about space because Albert Einstein proposed space stations to defend democracy in the atom age. They have a point. But shouldn't people

·····You Got a Point of Order?·····

John Lear's acid remarks on today's science-fiction writing will, the editors of PSM suspect, cause some astral addicts to reach for their ray guns, erying, "Blast off!" Others may wish to present him with an impervium-plated medal. For the five most interesting letters, of 150 words or less, commenting on this article, and received by Sept. 1, PSM will pay \$25 each. Address: The Editor, POPULAR SCIENCE MONTHLY, 353 Fourth Ave., New York 10, N. Y.

136 POPULAR SCIENCE

also know, and know first, about the strategic power vacuum of the Canadian Arctic? We can't do much with the North Star if we lose the North Pole.

This is not to imply endorsement of SF writers playing cops and cowboys if they play Royal Canadian Mounties and reindeer herders instead of chasing rustlers through the gulches of the Milky Way. I think SF should abandon completely the worn-out Wild West and private-eye themes. To put it bluntly: let's have some science in science-fiction!

By calling themselves writers, the signers of SF stories forfeit any right to be excused from the sweaty digging for facts and the still sweatier travail of disciplined imagining that might enable them to depict (as Jules Verne did with his submarines and flying machines) wonders that will sound plausible to us and commonplace to our children.

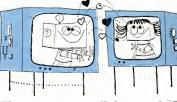
No Brain Waves for Ralph

It is fashionable for current SF practitioners to sneer at Hugo Gernsback's old SF classic—Ralph 124C41+—as "unreadable." But to me, Ralph is considerably less of a cardboard character than most of the tipsy space sailors I meet in SF today. At least Ralph's romance, though steeped in intellect, was mature. He didn't try any of the now-popular adolescent tricks like remote-controlled seduction through aphrodisiac brain waves.

Gernsback was wordy. He was Victorian, His story, however, moved logically. And his science, though wondrous, rang with possibility. It is not enough to remember him as father of modern SF. His sensitivity to significant trends calls for critical study in the light of science's implacable encroachment on all human affairs.

Ralph first appeared in print in 1911.

Yet through him Gernsback fancied the coming of TV, radar, simultaneous multilanguage translation, man-made rain, transatlantic airplanes, helicopters, cold light, night ball games, automatic packaging, the use of sound as a physical



Why not remote-controlled romance?

force, titanium, microfilm, rayon, artificially accelerated plant growth, glass brick, guaranteed bank deposits, directed research in science, and government domination of certain areas of research under a blanket of secrecy.

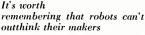
Incredible prophet that he was, Gernsback had no monopoly on the art. In the last decade, Robert Heinlein duplicated Ralph's panoramic vision in narrower compass with more immediate and spectacular results. Heinlein predicted not only the A-bomb but its use to annihilate a city to end a war.

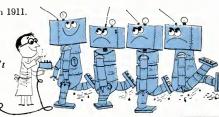
But where are Gernsback's and Heinlein's disciples? Why is their method so rarely followed in science-fiction?

The mailman brings me seeds for scientific speculation every day.

An atomic locomotive is now feasible. Railroads have been the subject of adventure stories for years. Trains will be vastly different when engines re-

[Continued on page 244]





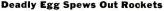


Radar in Tail Aims Bomber's Robot Guns

TAIL guns that are fired at targets automatically tracked by radar are now part of the armament of the Air Force's Boeing B-47E Stratojet bomber. The entire tail-turret system is remotely controlled.

This is how it works: In danger areas the radar is switched to "search." When it picks up an attacking plane, it begins supplying a computer with information for the 20-mm. guns. When the target is within range, the guns are fired. Two guns are mounted in the full-swiveling turret.





A HONEYCOMB of 52 rockets is carried on each wing of the Air Force's Northrop Scorpion fighter. The honeycombs, which look oddly like the egg-shaped nacelle housing an airplane's air-cooled engines, can be fired in salvo. A hit by even one of the 2.75-inch rockets can down a bomber. The Scorpion can climb higher than nine miles.



Airplane Is Moved Like a House

It was exactly like moving a house through the streets of Los Angeles when a Douglas attack plane with its wings on had to be trucked from the factory to Edwards Air Force Base, 171 miles away. Telephone poles, traffic signals and roadside trees had to be removed and replaced afterward. The speed? Five miles an hour.

Three-Winged "Flea" Flies 100 Miles an Hour



A TRIPLANE that its builder, George Frisbie of De Pere, Wis., calls "The Flea" has only a 20-foot wing span and flies at a speed of about 100 miles an hour. The little plane measures 15 feet in length.

Frisbie has test-flown it under the supervision of the Civil Aeronautics Administration, but there are still other tests to be made. He is also the inventor of a plane he hopes to sell in kit form.





A Bristol Freighter plane gulped down a midget plane recently through its huge front loading doors—and then proceeded to swallow a second one. The first was loaded headfirst, the second tailfirst.

The two smaller aircraft were destined for French Indochina. Bristols are used regularly as English Channel car ferries.



Radar Helps Pilot Shun Storms

THE days of those bouncy airliner flights in rough air will be over if a storm-detecting radar system being tried out by Panagra is adopted generally. It will "see" storms 150 miles away.

The company is testing the radar between Miami and Buenos Aires. It is installed in a DC-6B transport.



275 Tons of Steel-in One Hunk

This huge ingot, weighing as much as 160 Ford sedans, is on its way to a Bethlehem Steel forge to be pounded into a 110-foot column—one of 18 supports for a tremendous airplane press 10 stories high.



Man-Made Geyser Tests Nozzles

Water, pumped from the Allegheny River, geysered 150 feet in the air (above) when engineers tested nozzles for fountains that will spout from a pool in Point State Park, Pittsburgh.



Paper Overlay Upgrades Lumber

Scientists at the U.S. Forest Products Laboratory at Madison, Wis., have discovered that a single sheet of paper, treated with modern synthetic resins, will hide knots, pitch pockets, stains and narrow splits in a board (above). They have also found, by installing paper-overlaid pine siding on a test building (right), that it holds paint well outdoors and slows wood-swelling.





Bailing furiously with their helmets, damage-control crewmen improvise when pumps balk.

How Sailors Learn to Save a Ship

Daily they rescue a bogus cruiser "bombed" in a bogus ocean.

"THE bomb that hit the USS Buttercup was delivered by a lone plane at 1700 hours, just before evening chow. Shattering plates and rupturing mains, the resulting explosion might have been fatal to the cruiser had it not been for the skilled work of her damage-control parties."

This could have been a news dispatch from an artificial ship in an artificial ocean at the Philadelphia Naval Base Damage Control School. Daily it weathers a tape-recorded air attack, is ostensibly hit, ships water through real holes and threatens to sink, in order to teach U.S. sailors what to do if the danger ever becomes real.

The vessel, a two-deck section of a cruiser, floats in a tank. Its survival depends on the quick thinking and trained action of men who work in water up to their necks, bail where pumps would normally not function, fight smoke and fire, plug and patch. How they do it is shown in the photographs on the next two pages.



1 LIKE THE DUTCH BOY at the dike, a sailor stops a leak with one hand in damage-control drill as his mates rush repair work.



2 SHORING UP damaged bulkheads is an urgent task after the pumps, under mesh protectors at the men's feet, are back at work.



3 DOUSING A BLAZE that threatens further damage to the injured "ship," damage-control trainces use helmets as buckets.



4 EVACUATING THE "WOUNDED" to safer areas must go on while part of the rescue crew struggles to plug gaps in the hull.



6 ORDERS FROM THE BRIDGE of the ever-sailing, ever-sinking cruiser are megaphoned to the men toiling in water below decks.



7 REPORT FROM BELOW on the location of fire comes from a crewman in an oxygen mask, protected from smoke poisoning.



5 A NOTICEABLE LIST to the deck of the *Buttercup* develops as the damage-control party feeds pump hoses to flooded compart-

ments. The training vessel consists of a twodeck section of a U.S. cruiser. It is 48 feet long and its ocean is a large indoor tank.



8 ALL IS CONSIDERED LOST if, despite the rescue party's grueling efforts, this pointer indicates a list of seven degrees.



9 EXHAUSTED RESCUERS grimly catch their breath and rest while the inexhaustible Buttercup regains an even keel.

AUGUST 1954 143

Gus Rides Out a Storm By Martin Bunn

Two scared kids in a jam take the Model Garageman out into one storm to quell another—between irate parents!

AS DARKNESS came down, clouds piled up in the west and a sharp thunderstorm took the edge off the midsummer heat. Glad at the chance to catch up, Gus Wilson was working late at a top overhaul. The Model Garage lights were the only ones on in the dark business section of town.

The clatter of running footsteps outside the open shop door brought Gus from under the hood. Matt Bergstrom and Mrs. Adams, both winded, passed the pumps and made for him.

"Gus!" Matt puffed. "Haven't you got a boat up at the lake? May be trouble there—kids got caught out in the storm should've been back hours ago. I thought they were at the Adamses and she thought—"

"Tell me on the way," Gus cut in. He bustled them into his car, strode over to pull the main switch of the garage, and took out fast

Panic Sets In

By the time they neared the lake, Gus had the story. Bergstrom's taffy-haired daughter Sally had gone for a swim and picnic with 16-year-old Guy Adams. They'd taken the Bergstrom outboard, heading for the beach on the far side of Thatcher's Island. When Sally didn't show up for supper, Matt assumed they'd waited out the thunderstorm at Lora Adams' home. When, at nine, Lora had called him, a kind of

panic had begun to lick at both parents.
"Neither youngster is a strong swim-

mer," said Lora, "I just hope that storm didn't catch them out in—"

"Probably waited for the storm to blow over." Gus said quickly, "and then discovered the rain had drow—soaked the ignition." It occurred to him that Matt and Lora had infected each other with a highly contagious anxiety. "We'll be there in a couple of minutes now. If the lake's not too rough, we might take a run out to the island. Probably find them soaked and sheepish. Will you dig my flashlight out of the glove compartment. Matt?"

The Party Sets Out

Fair-sized waves were tossing Gus's 12-footer at its pole mooring, and rain water sloshed the floorboards. "Doesn't look so bad," Gus told them briskly. "Lora, you get in the bow and hang onto the flashlight. Matt, will you do some bailing from the middle seat?" He stripped off the cover, checked the gas and spun the kicker.

The wind was behind them as they headed out onto the lake. A past-full moon showed occasionally through scudding clouds, dinly picking out the ridge

behind Thatcher's Island.

"Don't stand a prayer of finding anything in all this blackness," said Matt grimly. "I think we ought to go back to a telephone. Call the state police and



Gus uncoupled both ends of the gas line and drew out a two-inch bronze filter element.

get them to start a real search going."

The same idea had been in Gus's mind for minutes. "Maybe you're right," he conceded. "But let's take a fast look at the beach first—we're almost there."

As they rounded the point of the is-

land, the hearts of all three in the boat gave a flip-flop—there was a campfire in the cove. The distant reddish light glinted off the aluminum hull of the beached Bergstrom boat, and two small figures danced like Indians in the fire-

light, Both Matt and Lora were calling as the boat slowed to coast in.

During the first moments of greeting, Gus busied himself with tilting the engine and pulling the hull up on the beach. Then he sauntered up to the group by the fire.

Storm Over the Lake

" . . . The silliest thing," Sally was saving, "Robinson Crusoe all over again my name's Friday. I guess we were a little late in starting home. Anyhow, the clouds were awfully black, and we were

just coming out of the cove when it began to rain like anything and I made Guy go back because I just knew we'd get struck by lightning. He said we could take off the motor and turn the boat over for shelter-it was just drenching - but I knew that that met-



just listen to this old buggy purr!"

al boat would attract lightning and-"

"So we just waited out the storm in the woods," Guy finished. "I tried to tell Sal that trees were no protection against lightning, but you know how it is with women."

Guy's good spirits evidently grated on Bergstrom. "That's all very well, young man. But the storm blew over hours ago. Why didn't you come home right afterward? Your mother and I were both extremely worried."

"Daddy, we tried to three times, but the motor kept sputtering out," Sally interjected. "The wind was against us and we didn't have any oars and that old motor kept stopping. So Guy built a fire in the cleverest way and we just waited until-

"That's enough," Matt cut in. "I'll talk to you later. Evidently you've never heard of smart alecks who manage to run out of gas when it suits them. Well, young man, what's your story?"

"Look," said Lora Adams, "must we

stand around here while you put witnesses on the stand? These children are wearing wet clothes and I think it's important to get them home instead of letting you sound off."

"I'm not sounding off, But I don't propose to let my daughter go out with a kid who can't even tell a straight story."

"You mean he can't get a word in. If vou'd stop bullving him enough-"

"Bullying-that's a laugh! The important thing is why a young girl was kept out for hours when there isn't a shred

of justif—"

'Motor kept conking out, Guy?" Gus tossed a piece of wood into the fire. "Sounds like rain got to it." He realized that the flare-up. even though it was just a reaction to anxiety. ought to be headed off if possible.

"Well, I thought

so too, Mr. Wilson, but it doesn't make any sense. Because each time it'd start right up and run fine at low speed with the prop in neutral. And then she'd quit as soon as we'd start out for home."

"That's very plausible, young manespecially the part about not making any sense. That motor runs like a clockhasn't missed a beat all season. What were you really doing—shutting off the gas line?" Matt's voice was icv.

"No, sir. I was not."

"Or did you just close the air valve on the cap so the gas wouldn't feed down?"

The Feud Begins

"I've had just about enough of this," said Mrs. Adams shrilly, "More than enough. I'm not going to stand around all night listening to somebody who's crazy as a hoot owl. Gus, will you take me home? You come with us, son-you've seen enough of the Bergstroms.'

[Continued on page 224]



How to

Hitch an Engine to Your Bike

A two-cycle power plant that you can attach with hand tools will whiz you along at 25 m.p.h. and run for only a few cents a day.

By Howard G. McEntee

EVEN the peppiest pedal pusher sometimes wishes he could keep rolling just by twisting a throttle. But the gap between an ordinary bike and a powered one ordinarily can't be plugged for much less than a hundred bucks—except with this homebuilt rig.

That doesn't mean jerry-built. This power unit is mechanically clean, functional, good-

looking. You don't have to be a machinist to make it; the whole job can be done with hand tools.

What does it cost? The engine is the most expensive item. Mine is a 1.5 hp. Power Products AH-36, costing \$47.50 brand-new. You can save by getting a factory rebuilt, with a new-engine guarantee, for about \$36. With its horizontal cylinder, this engine is ideal for rear-wheel mounting.

If you are willing to settle for 1 hp., the

AUGUST 1954 147



RIDING TRIM. Neat as a cotter pin, the rearmounted engine drives the wheel through a friction roller, leaving pedal drive and coaster brake intact. No machining is necessary; all the work can be done with hand tools.

model 1000 is available for about \$25. It was widely used on power mowers, and you may find a secondhand one for even less. The other materials add up to about \$13.

Roller drives the wheel. Only a friction drum or roller is mounted on the engine shaft; there are no pulleys or sprockets. Two coil springs pull the roller down against the top of the tire. This drive puts no torque strain on the spokes, and leaves the chain drive and coaster brake ready for normal use at any time.

The roller is disengaged from the tire by lifting the engine a fraction of an inch. This is done by a forked lever terminating in a handle below and in front of the seat. The clutch can be held out by a catch to let the engine idle at traffic stops.

Although the engine is on the left side, off center, no imbalance is noticed when riding. It may, however, tend to tip the bike if it is held up by a kick stand. A rear stand is more secure.

Put wheel in shape. The rear wheel bearings and coaster brake must be in good

order. Check the wheel for wobble. If the rim is warped, it may have to be replaced. Otherwise, a wobble can usually be repaired by adjusting spokes, a job for an expert.

Mounting the engine. My engine came with a blower, an aluminum base and a small muffler. I removed all these, plus the governor mechanism with its cover. Thus stripped, the engine weighs about 13 lb.

The engine mount and clutch parts are made of common strap- and angle iron, pipe and %" bolts. This is all simple hacksawing, filing and drilling. The rear fender has to be cut in two places. The rear bracket is clamped under the axle nuts, and the back fender section bolted to it. Two braces from the bracket are attached with clips to the rear fork.

The engine mount, consisting of two pieces of angle, pivots on the bracket and is connected to the clutch lever by slotted joints. Make certain the clutch lever is long enough so that its U-shaped yoke comes in front of the seat when it is up.

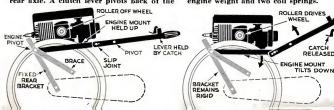
The clutch mount may have to go above or below the fork behind the seat post. Try it both ways before drilling for the clamp bolts, and space these to miss the frame members. On my bike, the mount fitted best with the angle up, so the tapped holes go through the apex of the angle stock.

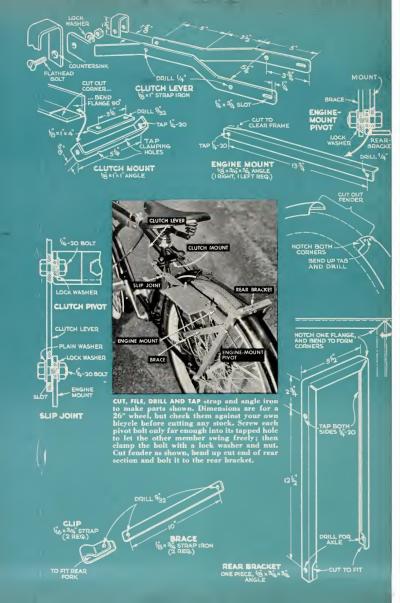
All bolts at the pivot joints must be positively locked, and drawn up to leave a minimum of play without binding. One member of each joint is therefore tapped. Drill No. 7 holes and thread them with a ½"-20 tap.

A 3/16" dural plate, 3½" by 6", is bolted to the left engine mount in two places and drilled to match the threaded mounting holes by which the engine was bolted to its base. You can clamp the plate to the dis-

How the Drive Works

All parts of the bicycle but the rear wheel and chain have been omitted in these diagrams for clarity. The engine mount pivots at the rear on a bracket rigidly bolted to the rear axle. A clutch lever pivots back of the seat post. It is connected to the engine mount by a slotted slip joint. When the clutch lever is held down, the roller is raised off the bike wheel. As the clutch lever is allowed to come up, the engine tilts down, and the roller is held in driving contact with the wheel by engine weight and two coil springs.





LIST OF MATERIALS

Engine: Power Products Model AH-36. type 1007 (Power Products Corp., Grafton, Wis.)

Roller: flat-belt pulley, compressed-paper face, metal hub, %" hole, 1%" to 2" dia., 2½" long. (Frank Tracy, Inc., 202 Centre St., NYC.)
Controls: auto choke cable (throttle),

bicycle brake lever and cable (com-

pression release).

Exhaust: Briggs & Stratton muffler No. 89966, %"-pipe floor flange, %"-by-4½" pipe nipple, ½" 90° elbow.

Compression release: plug-cock valve (%" pipe thread), %"-by-%"-by-2%" dural or brass plate.

Frame stock: 5' of %"-by-%" angle iron, 3%' of %"-by-1" flat iron, 2%' of %"-by-1" angle iron, 8" of %"-by-1"-by-1" angle iron, 12" 1/16"-by-%" strap iron, 12" of %" pipe. Engine plates: 3/10" dural or steel,

3½"-by-6" and 4"-by-5¼". Miscellaneous: Two tension springs, %" dia., 4" long; throttle and com-

pression-release springs, elbow catch, rubber clutch grip, sheet metal for guard, " bolts, nuts, lock washers.

COMPRESSION RELEASE makes starting easier. Cut two short fins off cylinder head as shown below. Space between plug and cylinder wall is too small to screw valve in directly, so it is mounted on a dural plate, and a hole is drilled in the head directly under it. Four holes are tapped 6-32 for mounting bolts. Cut gasket of exhaust-gasket stock. Take valve apart, clean off grease, lubricate with graphite. Mount spring as in lower photo.







WEIGHING ONLY 13 LB. with governor and blower removed, the engine rests on three spacers on a plate bolted to left engine mount. The roller (center photo) is a flat pulley, here shown with a radiator-hose sleeve cemented and screwed on it to increase

carded base and drill through it to spot the holes.

Making the roller. I first used a 1%"diameter flat-belt pulley made of impregnated, compressed paper, with a rubber-hose sleeve over it. The hose was cemented on with Pliobond and further secured with three 6-32 screws, with star washers under them, at each end.

Later I switched to a 2" pulley of the same kind, without the rubber sleeve. This works well and has nothing to come loose. A similar cast-iron pulley could be grooved longitudinally to increase its driving friction.

The roller diameter determines your drive ratio (wheel size has nothing to do with it). If you live in hilly country, or want maximum pickup, you might try a 11/2" roller. A 2" roller, however, makes the engine easier to start, and gives higher top speed and better gas mileage.

Aligning the roller. Check the required height of the engine shaft (roller diameter considered) above the tire. Then saw three spacers from "pipe and file the ends square to the required length. Mount the engine with %" bolts and lock washers. Be sure the bolts enter the threaded holes far enough to hold securely, but not so far that they hit bottom.

With the engine in place, the roller can be mounted on the shaft. The pulley I used has a metal hub, with a keyway and a setscrew. But my engine had no keyway, so I drilled and tapped the hub for a second setscrew 90° from the first, centered the roller over the tire, and spotted dimples in the shaft through the setscrew holes.

'A vertical 3/16" plate is bolted to the

150 POPULAR SCIENCE





its diameter. A pulley of suitable size will drive without the sleeve. Note pipe flange fitted to exhaust port (above) and throttle return spring (over shaft). A 3/16"-by-4". by-5½4" plate (right, above) is bolted to the right-hand engine mount. Long bolts and

spacers tie it to the engine crankcase. A strong spring on each side, hooked into a hole in engine mount and on the bolt holding the brace to the fork, pulls roller against tire. Adjust tension by moving brace. Bike wheel must rotate engine past compression.

right-hand engine mount. Long %"-20 bolts, with spacers on them, enter two of three tapped holes in the crankcase by which the governor cover was formerly attached.

The controls. An auto choke cable on the right handle bar controls the throttle. No cable is needed for the choke; the rider can easily reach behind to open it after the engine warms up. However, I did add a compression release to make starting easier. This is a small plug cock (made for a compressed-air system) mounted on the cylinder head, with a control cable to it.

Try starting up without a compression release; you may not need one. If you do, take off the cylinder and cut off two of the short cylinder fins on one side of the spark plug with a coping saw, afterward filing the surface flat. As there is not room between the plug and the cylinder wall to screw in the valve itself, I mounted it on a small plate as shown on the facing page.

Guard and muffler. A roller guard, bent from light sheet metal, is bolted to the fender in front and the engine bracket in back as shown on page 148. Although mine ducks under the exhaust pipe, it could be run over it and even widened to enclose the pipe and muffler. The flywheel is a smooth bell without spokes or projections, and seemed to require no guard.

The original muffler would not clear the tire, so a ½"-pipe floor flange was cut down to fit the exhaust port, and a pipe nipple and elbow screwed on. As the original muffler had little quieting effect, I installed a bigger, more efficient one.

When starting out, drop the roller on the tire before starting to pedal. Open the com-

AUGUST 1954 [5]

pression release, start pumping, and when the flywheel is turning, close the release and open the throttle. To start up with the engine already running, disengage the clutch and pedal off; then let the clutch engage. Engaging it from a standing start will wear the roller unnecessarily.



THROTILE IS CONTROLLED by an auto choke cable run up the right handle bar. A small collar held by a setserew adjusts idling position. The lever under the hand grip is for a front-wheel caliper brake, desirable with motor power to relieve coaster brake of some of its load. The compression-release control, a similar lever, is on left handle bar.

CLUTCH IS HELD in disengaged position by an ordinary cupboard elbow catch, fastened to the upper frame bar with two self-tapping screws or with 6-32 bolts in tapped holes.





New for Your Car



2. Wheel Stop Protects Garage Wall. Drive that long new car all the way into the garage and stop a fraction of an inch from the wall with the help of this adjustable wheel stop. Extend it so the wheels hit the stop bar just before the bumper touches the wall, to provide maximum clearance at the back end for closing the garage doors.

4. Feather Identifies Car. You'll locate your car instantly among hundreds of others in a crowded parking lot if it flies this brightly-colored pheasant feather on its antenna. The feather also indicates the wind direction when the car is standing still.

1. Car Cover Is Awning, Too. Pull this cover out of a roller attached to your car's rear bumper to protect it from the elements. Release it, and it rolls itself up. A broad awning and supporting arms fitted with suction cups that grip the side of the car can be added to provide a shady spot or dressing tent at the beach.



3. Car Necessities Are Combined in Kit. This neat vinyl plastic case holds an assortment of handy objects for your car. It contains a whisk broom, windshield scraper and cleaning cloth, bottle opener, comb, pencil, screwdriver, sewing kit and a small flashlight. When closed, the kit fits compactly in the glove compartment.





5. Lever Lifts Wheel on Drum Lugs. Put your spare wheel on without effort next time you get a flat. This wheel lifter centers it and slides it up on the lugs in one motion. It can be used on drums having holes for bolts, or on the type with studs.



6. Attachment Draws Vapors from Crankcase. Installed on the crankcase breather pipe or overhead-valve cover, this unit draws sludge-forming vapors out of the crankcase and delivers them to the intake manifold to be burned away with the fuel mixture. The manufacturer claims that it extends the useful life of the oil and filter, and adds light lubrication to the tops of the cylinders and valve stems.



7. Spray Dries Wet Ignition. Differing from insulating spray that keeps water out of a car's ignition system, this chemical is sprayed over the electrical equipment to drive the wetness out. It is claimed that a water-soaked circuit can be put in service a few minutes after spraying, and that the application will protect the system for several months after. The solution can also be used to coat tools against rust.



8. Seat Covers Resist Burns. Sparks from a cigarette, or even a lighted match accidentally dropped on the seat, won't burn holes in these seat covers. The fabric is impregnated with a special resin, which the manufacturer claims releases a flame-smothering gas when heated. The covers are woven of the same material used to make tire casings and are said to be static-free and impossible to tear.

Further information on these new cor products can be obtained from: 1. Rulloft Car Cover, Inc., 1610 N. Wilcox Ave., Hollswood 28, Califf; 2. Arthur H. Kitson, Inc., 2088 Harper tee, Detroil 59, 3. Ace Stocke, 10 E. 39 Sto., NC 16; 4. Geral Industries, Inc., 2268 Whion St., Toledo 6. Ohio; 5. Wheel Lifters, Inc., 1990 Main St., Baise, Idaho, Percision Praducts Co., Harvard, Ill.; 7. Spradic Co., 323 Hando Ave., Chellance 6. A.C.; 8. Banner Ulg., Co., Inc., 34 Preson Curreits and Combines 34, NY.

Your Shop Can Save

Sprucing up the old homestead yourself can put dollars in your pocket—and be fun, too!

DO YOU think of a workshop as just a place to play? Ideally, it's most relaxing that way, But there are times when a shop

justifies its existence in a more material way. Storm windows, screens and other home improvements that come out of a shop can make it a source of pride—and dollar savings—for the entire family instead of just a place where Dad secludes himself to putter around.

Most impressive-and often easiest to





You Money

make—are things that dress up a home. Below is the first of four projects that can be made in any workshop-from the most elaborate, down to the small bench and rack of hand tools-and they'll give a reputation to both you and your shop. Remember, too, the dollars you save can go toward new equipment to help you save even more.



Under Cover for \$3

Wire lath, shelving and strips of molding go together to make this attractive radiator cover.

ADE without elaborate carpentry or framing, this radiator cover provides a rainv-day play surface for tots and keeps them away from the hot metal.

Nail quarter-round molding to the floor around the radiator and bend a piece of wire lath-the expanded type used by plasterers-to fit snugly inside it. Cut two strips of one-by-two and nail them inside the vertical rear edges of the lath to stiffen them. Bend the sharp ends over the one-bytwo strips to get them safely back against the wall.

Place the lath in position around the radiator and cut the top from shelving or " plywood to fit over the top edges, Nail 1" half-round molding to three sides of the top, leaving the extra 4" projecting below the bottom surface to retain the lath.

When you're satisfied that all is square and level, fasten the top to the wall or window apron, using one of several methods shown on the following page, so that the cover can be removed for cleaning inside,

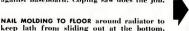
Paint the base molding and shelf to match the woodwork in the room. The wire lath comes finished black and need not be painted, but if you decide to finish it, too, you'll find a paint spray bomb much easier for the job than a brush.—Elizabeth H. Wagner. White Plains, N.Y.



USE MITER BOX to cut neat, tight-fitting 45° corners in quarter-round molding.



SHAPE WALL ENDS of sidepieces to fit snugly against baseboard. Coping saw does the job.



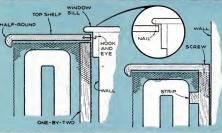




BEND WIRE LATH around edge of board to get erisp corners (left). Nail rear edges to strips of one-by-two and bend sharp ends of wire over (right). Set top on lath and job is practically complete (lower left). Drawing below shows several methods of fastening top to the wall or window apron.









Make a Copper Hood to Dress Up Your Fireplace

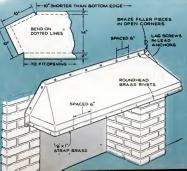
This hood can work wonders for your draft-dodging fireplace. It's mighty good-looking, too.

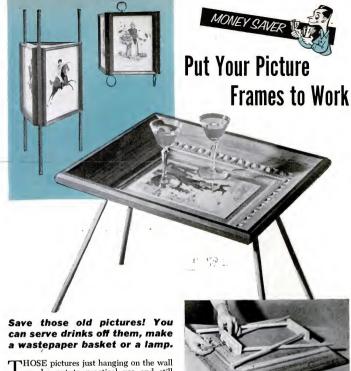
A GLEAMING copper hood will certainly improve the appearance of a large fireplace, but more important, it will increase the draft, making the fire burn cleaner.

Make it from a sheet of copper at least 1/32" thick, cut and bent to fit over the opening. Bend up a flange on the three edges that fit against the brick and braze a piece of copper over the gap in each top corner of the flange. Bind the overhanging edge with %" strap brass.

Hang the hood over the fireplace opening with lag screws set in lead anchors. —Hi Sibley, Nuevo, Calif.







LEGS, glued into beveled blocks, fold flat on hinges so table can be hung on the wall.

THOSE pictures just hanging on the wall can be put to practical use and still decorate a room. These ideas show how you can make framed pictures into charming room accessories. One idea gives a picture a double purpose: an occasional table for tea or cocktails, which can be folded and hung out of the way on the wall . . . as a picture.

Choose a picture in a heavy frame for conversion to a table. Make legs by gluing X" dowels in holes drilled at a slight angle in beveled wood blocks. Attach the blocks to the back of the frame with hinges so that the legs will fold flat against it. The legs should be about 15" long, shorter if they extend beyond the edges of the frame when folded.

Use four frames of the same size and shape for the wall lamp. Assemble them into a square by gluing or nailing the inside edges to cleats. Remove the picture from the frame that rests against the wall and replace it with a piece of %" plywood. Screw the light fixture to the plywood and attach the hanging ring to the top edge of the rear frame. Screw a ring at each lower corner of the front frame to trim it off.

Join three identical frames on three 18" lengths of ½" dowel to make the off-the-floor wastebasket. Attach the dowels to the edges of the frames with glue and nails. Fit a triangular piece of plywood inside the frames at the bottom to complete the basket. Lacquer the dowels to match frames and finish off the tops by driving rubber-headed tacks in the dowel ends.

Please turn the page for more money-saving ideas. AUGUST 1954 157



Frame Your Pictures with Siding

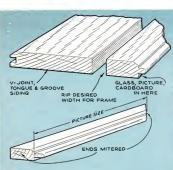
The tongued edge makes perfect picture-frame molding, All that you have to do is cut it to size.



CHORT ends of V-joint tongue-and-groove boards cost you next to nothing. The underside of the tongue is already rabbeted deep enough for a picture, glass and backing board. The top beveled surface and rounded edge of the tongue resemble a decorative molding.

Rip the boards to the desired width and cut the ends in a miter box, measuring along the inside edge of the rabbet when cutting to length to fit picture. Make an assembly jig by nailing two strips of plywood to a flat board. Use a framing square to be sure the two strips are nailed at 90° to each other. Lay the frame pieces in the jig face down, pressing the top and one side against the plywood strips. If the parts are cut accurately, the bottom and opposite side should fit squarely against them. Drive nails into the board to hold the frame together while you drive a corrugated fastener across each joint.

Sand the face and edges smooth and finish as desired. Insert the picture, with or without glass, as you prefer, and cardboard backing. Glue wrapping paper over the back to give the job a professional touch .-Leslie P. Young, Sarasota, Fla.



THIS IS V-JOINT SIDING. Rip off tongued edge to width needed for picture frame and use it just as it is. When cutting to fit picture, measure along inside of rab-bet, not edge of tongue. Miter pieces accurately, or frame will not be square.



ASSEMBLY JIG helps put the frame together. Plywood strips hold top and one side square while the bottom and opposite side are fitted to them. When entire frame is square, drive nails into the board to hold the two loose parts in place while corners are fastened with corrugated metal fasteners.



New for the Handy Man

1. Electric Drill Starts Mower Engine. Instead of yanking a starting rope, mower owners can now start their engines with an attachment that fits in the chuck of an electric drill. The device engages a cone pulley, which is attached to the crankshaft, spinning the mower engine until it starts.



2. Lawn-Sprinkler System Is Permanent.
Packed as a kit, to be fitted and installed in lawns of any size and shape, this sprinkler ends dragging out a hose for watering the grass. Eight sprinkler heads, set flush in the ground, cover a large area.



3. Utility Hook Has Many Uses. Shown here supporting a garbage can out of reach of dogs, this handy hook can also serve as a hanger for garden tools, fire pails, coils of wire, clothesline and laundry bags. Three screws anchor the hook securely wherever you need it.



4. Wand Kills Weeds. Fill this clear-plastic tube with weed-killing solution and eliminate dandelions, thistle and other pests from your lawn. Press the lower end of the tube over the weed center. A sponge tip saturates the weed without harming nearby plants.

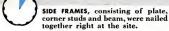
5. Tack Puller Drives 'Em, Too. One end of this tacking tool has a magnetic surface that grips the head of a tack for easy driving (far right). The other end has a slide-out claw that pulls tacks and deposits them inside the holder for re-use.

1. Flint Engineering Co., P.O. Box 605, Flint, Mich.; 2. Plastipipe, Inc., 5544 W. 164 St., Los Angeles; 3. Engman Mfg. Co., 1317 Locust St., Des Moines, Iowa; 4. Gro-Quick Sales, 10342 Lanark Ave., Detroit 4; 3. Osrow Products Co., Inc., 93-10 218 St., Queens Village 29, N. 1985.

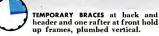


AUGUST 1954 159







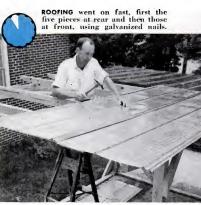




THERE'S no need to let that handsome new hunk of sheet metal stand out in the broiling sun—or in the frozen sleet to come—if you allot about \$35 and one good day's work to remedying the situation. It's an easy, rather pleasant job, and even if you dawdle disgracefully, it'll be done in a weekend.

I cut the plates, studs and rafters to shape, laid out each side flat on the driveway, and nailed it together with 16-penny common nails. After making another side frame, I raised the two (borrowing a neighbor's hands helps here), nailed the rear cross plate in place, and put on temporary braces.

After the frame was plumbed with a level, I added the two-by-six headers and



the corner braces. Bigger braces might be desirable if the site is exposed to high winds, but may involve you in a head-conking hazard. Next came the rafters, which were placed on 36" centers, with the exception of the fourth rafter from the front. This one was spotted where it was most useful in backing up the overlap of the sheet-metal roof.

I used V-crimp galvanized roofing, and needed five sheets of 24" by 10', and five of 24" by 8'. This gave me a 9" extension beyond the framing at each end and a 3" overlap at the center. The floor plates were secured to the concrete by lag bolts run into star-drilled holes. A fast coat of paint on the exposed wood finished the job.—John Rogers, Decatur, Ga.





GENEROUS WORKING SURFACE is provided by extensions on each side of saw table. Blade adjusts for depth of cut but does not tilt. Rip fence and miter gauge are included; guard and splitter are extra.

HITCHING POWER TO TOOLS

CHANGING IS QUICK AND EASY. Spindle housing (arrow) on power unit is machined to fit split boss in tool casting. Tightening one screw locks unit securely in place. Blade is mounted directly on spindle.

MOUNT TOOLS ON WORKBENCH in seconds with quick-locking bench stand. Tapered stud (arrow) serces into side of unit and draws it tight against stand as T-handled screw is tightened against taper.

Husky Drill Drives Quick-Change Tools

COMPLETE SHOP ON ONE BENCH. Power unit is being attached to portable saw (below) while other tools stand by ready for action. Grinding attachment (on bench at right below) has housed wheel and adjustable tool rest





This versatile outfit bridges

BY PURCHASING all these rugged workshop attachments in one package, you can quickly fit out a home shop at reasonable cost. Or, they may be bought as needed, starting with the basic power unit, which includes a ½" capacity Jacobs drill chuck, polishing bonnet, sanding disks and back-up pad, spindle arbor for buffing or grinding wheels, and an extra handle for use on either side of the drill.

162 POPULAR SCIENCE

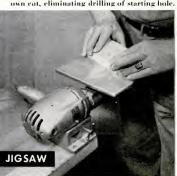


DRIVEN AT 3,200 R.P.M. by power unit, well-balanced portable saw cuts to 17%" depth—deep enough to handle joists, rafters and all other humber used in home construction. It uses same 6" blade as table saw.

TILT TABLE and adjustable angle gauge permit sauding compound angles. Sandpaper is applied to 6" disk with adhesive. Table is attached to heach stand by two screws shown ONE-THIRD OF STANDARD SHEET OF SANDPAPER is held on rubber-backed sanding shoe by two spring elips. Mechanism is counterbalanced, reducing vibration to minimum. Sander produces smooth finish on wood or metal.

SHOWN HERE WITH TABLE for bench use, jigsaw can also be used without table as portable jigsaw for cutting into large panels of wood or sheet metal. When hand-held, it starts its own cat, climinating drilling of starting hole.





the gap between light attachments and heavy combination tools.

The heart and muscle of the attachments is a heavy-duty ½-horsepower unit rated at 4.0 amps. It is not just an electric drill that can be used with attachments, but rather, a compact power plant, made to drive the attachments, and supplying more than enough power for the many operations that can be performed with them. Its speed, 3,200 r.p.m., is faster than most electric drills, making sawing and sanding easier

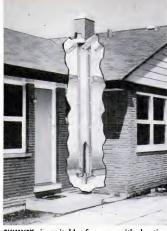
and faster. You can buy an extra power unit without cluck or accessories for economical permanent installation in one of the most-used attachments, such as the portable saw or table saw. Tightening one screw locks the unit to any attachment or to the bench stand without fussing. Called the 888 power unit, it will be in hardware stores in September. Millers Falls Company, Greenfield, Mass., makes it.

Kit Makes It Easy to Build a Chimney

No need to be a mason. Just put together the prefab sections.

YOU might think building a chimney is a job for an expert mason. Well, here is a kit chimney that can be put up in three hours. Four textured panels mounted around the roof flue give the appearance of brick. The panels are 3/16" cement-asbestos that can be painted to match any color. They are available in various heights. To top it off, a rain cap that comes with the kit keeps rain from entering the flue. Installation of the flue sections is about as easy as stacking blocks. Thermal-setting cement takes care of the hard work.

The Van-Packer Corp., 209 South LaSalle St., Chicago, makes the kit.



CHIMNEY is suitable for use with heating plant or incinerator. Manufacturer does not recommend use with a fireplace—the opening is too large to be readily adapted.

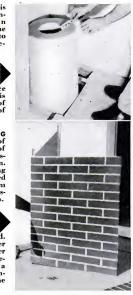


CHIMNEY SUPPORT is seated in floor opening cut between joists. All sides of the support are nailed to framed opening between the joists.

FIUE JOINTS are cemented and secured with an aluminum drawband. Clearance from flue to wood is unnecessary because of insulating capacity of masonry sections.

ALUMNUM FLASHING
is installed on roof
around the base of
the flue to keep moisture from seeping in.
The roof and ceiling
openings were projected
with a plumb line from
the floor to permit passage of the flue sections.

"BRICK" PANEL housing, 16" by 24", for the chimney is assembled on the ground. Before putting it over the flue, the proper pitch of the roof is determined by placing a panel flat on the finished flue. Panels come in lengths up to 5'.

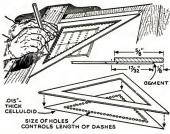


164 POPULAR SCIENCE



Calk Compound Cleans Clocks

CALKING compound of the cord type, which has a prolonged tackiness, is handy for extracting dirt from clocks, cameras and other mechanisms. Shape a piece so it will reach the material to be removed. After the compound has picked up a quantity of dirt, knead it to expose a fresh surface.—Walter E. Burton, Akron, Ohio.



Drawing Dashes Is Easier

With this reworked celluloid drafting triangle, drawing dashes becomes almost as simple as drawing a solid line.

Any triangle can be used. Enlarge the center to leave a strip about %" wide. To get the inner edge parallel, use a saw and then file accurately to the line.

Celluloid, sold in auto stores for convertible windows, is suitable for the inner part. Cut it %" smaller than the triangle. The recess thus formed will keep ink from seeping under the outer triangle edge.

Lay out the holes with their centers 1/32" inside the triangle edge. A countersink gives a satisfactory bevel. Make the holes a bit larger than the dash length desired. Attach the parts with film cement.— E. P. Meyer, Albuquerque, N. M.

Flagpole Walks Out of Hole

AFTER dirt had been dug away from the concrete footing of a flagpole that was to be removed, it was found that a derrick would be needed to lift the heavy weight out of the hole. Two smart men worked together to walk the footing out by tilting it and shoveling earth under the raised side. Then they leaned it in the opposite direction and tamped soil under the opposite side. This was continued until the concrete block was at surface level, where it was rolled to a truck and loaded on.



How I Make Scratch Pads

If you are an amateur photographer, what do you do with the unsatisfactory prints you discard in the darkroom? I cut mine into uniform sizes and use the backs as handy scratch pads on the telephone desk.—Clinton R. Hull, Costa Mesa, Calif.



He Shoots Pin-Ups

This ace photographer of boats and boating has gone down to the sea with his camera for better than 50 years. Here he tells how to shoot sea, ships and sky.



at Sea

By Dave Stanley



RACING HYDROPLANE leaps clear of the water. Photo trick here is to anticipate not only the second of the leap but the split second when the boat will be at the peak of its lift.

ONE of the biggest threats to America's peace of mind is a soft-spoken, gray-eyed, 68-year-old salt who lives on an island about 15 miles from New York's Times Square. He disturbs the serenity of factories, offices and homes from coast to coast by inspiring millions to daydream. This menace is Morris Rosenfeld, America's No. 1 boat photographer.

For half a century, he has been clicking his shutter at stately windjammers, sleek ceeangoing sloops, Snipes, bugeyes and prams. In magazines, government films, travelogues, ads—even as huge murals in famous sea-food restaurants—these eye-filling photographs of boats heeling gracefully before the wind have stirred the national wanderlust.

Although Rosenfeld runs a thriving photographic studio, his mainstay and first love is taking pictures of boats. And his marine-camera wizardry has paid off handsomely. Prints of his famous nautical pictures hang in yacht clubs and homes of boatowners from Maine to the Persian Gulf.

Steady Hands and Stout Sea Legs

If you're Morris Rosenfeld, you generally shoot from your own motorboat, the *Foto*, a 23-knot studio-darkroom. You shoot from a deck that bucks like an unbroken mustang, holding your camera steady with both hands and balancing yourself only with your sea legs. You will chase a

RACING SLOOPS tack on the windward leg. You have to know racing tactics, as Morris Rosenfeld does, to be in the right place at the right time to get dramatic shots like this.



STARTLING SPRAY PATTERN made by this sport fisherman is a Rosenfeld trick, not often used. Boat is following in wake of the Foto. Nature furnished the nice clouds, he adds.

GOING GETS ROUGH sometimes—and tough for the photographer who is using both hands to hold his camera. Rosy's camera case almost slid into the sea while he took this. craft for hours, while keeping out of the way of other boats in a championship race, to frame your target in the best relationship to sea and sky.

Sitting in his spacious New York studio, Rosenfeld told me that the key to marine photography is "knowing what to say." Knowing what to say, however, presumes a keen knowledge of boating, as well as cameras, film and filters.

Sea Savvy Wins Him Rare Shots

His nautical savvy, for example, tips him off when a new tack is to be taken. Alertness to what strong winds can do has brought him rare shots of masts snapping off or boats heeling completely over.

Rosenfeld is also a first-rate mechanic. Not long ago the Foto was stalled off Long Island. Heavy winds threatened to hurl it against jagged reefs. Rosenfeld quickly traced the trouble to the carburetor, took it apart, repaired it and reassembled it. Before long the Foto was chugging safely away from the reef.

The sky and the water always fascinated Rosenfeld, who bought his first camera, a 4-by-5 Graphic, back in 1896. Actually, the poor East Side kid didn't buy it himself; he went "halfies" with some grade-school chums. When his day for the camera came,

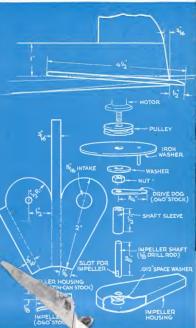


Speedster



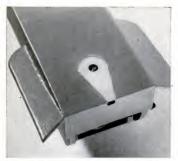
cement.a couple of ounces of ballast to the front of the bulkhead. A ping-pong ball forms the pilot's head, and the windshield is a scrap of acetate sheeting edged with tin. To finish off the bull, sand down the assembly and cover it with model tissue, then paint with hot-fuel-proof dope.

Pump and housing. Before building an engine mount, the driving unit should be





OFF TO A FLYING START, the hydrojet speedster is already climbing. Top and side elevations on opposite page are half size for a boat powered by an .047 displacement engine. The upper detail drawing at left indicates the planing angle; the exploded section below it, the pump-housing pattern and impeller-and-shaft assembly.



OPENING AT BOTTOM OF PUMP HOUSING takes in water which is kicked back through rectangular port at the stern. The planing angle of the hull eliminates need for a water scoop.

assembled and placed in the hull. The pump housing is made from a single piece of tin-can stock (see detail drawing). Dotted lines are right-angle bends, and the tab extension between the pear-shaped bottom and top sections is curved around the rotor end to form a continuation of the sides. Butting edges are soldered, starting at the nozzle to insure good alignment. Make sure that the bearing hole is centered with the larger water-intake hole. A short piece of tubing should be soldered over the bearing hole to keep the impeller shaft aligned. This impeller shaft has a slot sawed in one end to receive the blade, which is a strip of thin brass stock curved in the form of a shallow S.

Before mounting the blade in the housing, solder a short arm, or "dog," to the top of the impeller shaft. Then tin both the slotted end of the shaft and the blade, scraping off just enough solder to let the notch slip firmly over the center of the blade. To mount, turn the housing upside down and press the shaft through the bearing from below. Drop a small washer through the water-intake hole and over the notched shaft end. Slip the blade through the nozzle with tweezers and press it onto the shaft. Rotate the shaft to make sure the blade doesn't scrape against the housing, then solder it in position.

Engine. The power plant is a miniature gas engine, suspended in a U frame of %" sheet balsa directly above the impeller shaft. For the slightly angled coupling between the engine and shaft, a pin on a flywheel engages the shaft dog. The flywheel is a large iron washer backed up by a small V-groove pulley turned from hardwood. Mount the fuel tank on one side of the cockpit floor and connect it to the engine with plastic hose.

Operation. The hydrojet boat is started by winding a number of turns of string around the grooved pulley and then hauling the twine sharply back through the engine frame.

If you don't want to chase the craft with a rowboat, tether it to a line from five to six feet long. One end of the line is attached to an upright post, the other to the side of the hull nearest the fuel tank. Otherwise centrifugal force would starve the engine.

END



over joint to keep out light. The result is a bellows length that takes 'em big.—Clarence Leino, West Allis, Wis.

172 POPULAR SCIENCE

Piece of String Doubles Scale Capacity

EVER want to weigh a package with an undersize hook scale? It's simple, providing the package doesn't weigh more than twice as much as the scale capacity.

Attach one end of a piece of twine to an overhead support beside the suspended scale. Carry the other end down through an eye tied to the package, and double it back to the hook on the scale. Let the package slide to the bottom of the line. Multiply the scale reading by two, as the load is shared equally by the scale and the attached piece of string.—Frank Yatsko, Bethlehem, Pa.





Handle-Bar Grips Ease Work with Wheelbarrow

BICYCLE handle-bar grips shoved on the handles of a tubular-frame wheelbarrow will cushion your hand against the rough metal and prevent a lot of blisters when hauling heavy loads. Buy grips tailored to fit the hand.—Fred M. Pease, El Paso, Tex.

Homemade Jig Balances the Noise Out of Fan Blades in Jig Time

Your fan will keep you cool with less noise if you balance the blades to reduce or eliminate vibration.

Motor resistance may make this difficult when they're mounted, but it's easy to make a balancing jig. At one end of a wood base, mount an upright slightly taller than the radius of the fan. Fasten a similar upright to one end of a slotted strip secured to the base by a bolt and wing nut. This permits the spacing between the uprights to be varied. Astride a centered notch in the upper end of each upright mount a pair of roller bearings.

To balance the fan blade, rest it on the bearings on its own shaft or a piece of straight drill rod of the right diameter. If there is a considerable imbalance, the heaviest spot will move to the bottom. If there is only slight imbalance, the blade may not move. Tap lightly and repeatedly on one of the uprights. This will cause the blade

to rotate until its heaviest part is at the bottom.

Achieve good balance either by adding weight to the light or uppermost side—or by removing material from the heavy side.—Walter E. Burton, Akron, Ohio.



10 USES FOR Pipe Scraps



ROLLERS FOR HEAVY ARTICLES





FERRULE FOR TOOL HANDLES



BEARING

HARDWOOD, PLASTIC OR LEAD ENDS TURNED TO 4 PRESS FIT

WELD









SHEET-METAL-FORMING BAR



FLAG.



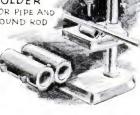






RON FURNACE







TAPERED FLUTES, SPIRALS AND THREADS, all cut in wood. Turn the page to see how you can make some just like them.

Can You Guess How The Amod The Lange Water Made?

By Herb Pfister

NO, THESE were not made by an old-time wood turner-in fact, they weren't made by hand at all. Here's a tip: they were turned on a back-geared metal-cutting lathe, using the lead screw to advance the carriage by power feed. Now all you have to figure out is how such crisp cuts were made in wood with the slow spindle speed of a back-geared lathe. Remember, it takes plenty of speed where the cutter meets the work to shape wood without splintering it. Think those internal and external Acme threads were made with a big tap and die? Or were they cut with a chasing tool held in a hand that instinctively leads four threads to the inch? Guess again. Give up? Then turn the

Give up? Then turn the page to see how your lathe and a homemade attachment work together to do these and a lot of other trick jobs that would be tough to do by any other method.

AUGUST 1954 175



This Attachment Does the Job

YOU can make one like it at home. It's a tool-post router with a chuck to drive a variety of router bits and burrs of different shapes. Bolted to the T slot of the lathe compound, it does the actual cutting at high speed while the lathe turns slowly in back gear, moving the carriage along at coarse feeds such as four threads per inch.

Mounted on the lathe corpound, the spindle is at the same height as the lathe center-line, but it can be bolted to an auxiliary block clamped in a lathe milling attachment for cutting above the work, as when undercutting insulation in an electric-motor armature.

Four typical setups for turning flutes, spirals and threads are shown at right.

low to Build the Attachment

CHAPE the body from a piece of 1%" maple. Dress all surfaces parallel, cut the recess for the clamping bolt and smooth it with a 1"-diameter drum sander in the drill press. Bore snug-fitting recesses for the ball bearing with a circle cutter set to slightly less than the diameter of the bearing's outer race. Clean up the recesses and bring them to the required depth with a flat-bottomed router. Drill a "in" hole through the two recesses for the ½" spindle. Glue body to a T-shaped base cut to fit in the lathe compound.

Make the spindle from a 4%" length of %" reach and thread it in the lathe to match the threads of the chuck you're using. Turn and fit the handwheel, step pulleys and collars, and assemble the spindle on two %"-bore ball bearings pressed into the recesses.

Glue a ""-thick block of maple to the top of the body and fasten a sewing-machine motor to it with two steel angles. Check the rotation of the motor; it must run counterclockwise to turn the spindle clockwise, seen from the handwheel end. If necessary, reverse its rotation by switching the wires leading to the brush terminals,

A round rubber sewing-machine belt drives the spindle. Cut the belt guard from a strip of %" maple and fasten it over the pulleys with a thumbscrew and a %" stud driven into the side of the body.

Bolt the attachment to the lathe compound with a ** bolt and a washer filed to fit the T slot, and give it a trial run before painting. Finish with a coat of shellac followed by a coat of machine-gray enamel.

For use with the lathe's milling attach-

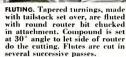
CUT BEARING RECESSES with a circle cutter. Make trial settings in scrap wood for a tight fit. Remove center material and bring recess to depth with a flat-bottomed router.



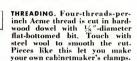
176 POPULAR SCIENCE







BEADING. Beading bit is fed straight into work. Carriage is moved by lead screw with gear set up for coarse feed of four threads per inch. Lathe spindle is turned at slowest back-gear speed so cutter can work.



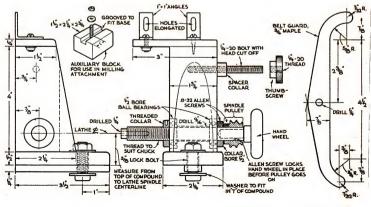
INTERNAL THREADING. One of the hardest jobs in woodworking, this is easily done with a threading bit, made from ½" brass rod and ½" drill rod. It chews out Acme thread that exactly matches threaded dowel.







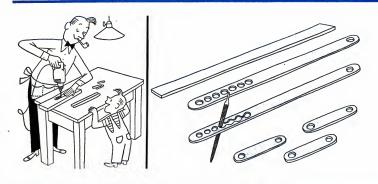
ment, make an auxiliary block of maple with a groove down its center to fit the T base of the spiral cutter. Bolt the cutter to this block and clamp the overhanging end in the jaws of the milling attachment. This permits vertical adjustment of the cutter as well as the horizontal motion provided by the compound.

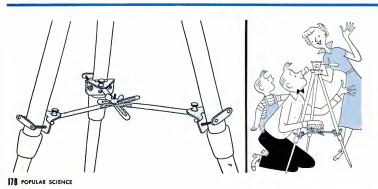


By Roy Doty and Robert Hertzberg

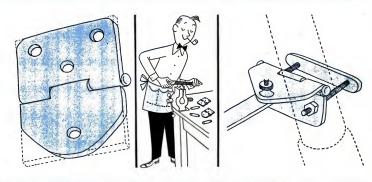
Wordless Workshop

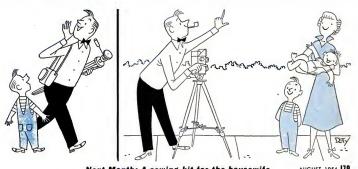












Next Month: A sewing kit for the housewife.

AUGUST 1954 179



Knowing the pitch and run of a roof, you can quickly determine the length of hip, common or valley rafters. A calibrated scale transposes the run into feet of climb according to the pitch. You can get the rafter length by stepping off the dividers.



3. Steel Rule Swivel Tip. Instead of remembering to deduct 1/32" from an inside measurement made with most hook-tip rules, just swing the tip of this one out of the way to bring the end of the rule against the work. The rule can be had in lengths up to 10 feet and has a tape lock.

4. Holders Hang Wrenches on Wall. Each of these wrench sets is packed in a holder which can be screwed to the workshop wall, displaying the tools for quick selection. A wide assortment of box, socket and open-end wrenches is available.





2. Flexible Grinding Wheel Smooths Contours. Hundreds of abrasive-cloth leaves sealed to a hard core present a continuous but flexible abrasive surface to metal parts. Using it, there is no danger of digging in, as with a hard abrasive wheel. It comes with arbor and centering flanges for use with a motor or flexible shaft.



5. Sander and Files Have Adjustable Handles. These holders for files and sandpaper have two handles for accurate and comfortable working in any position. Files are interchangeable and are made in a variety of patterns. Sandpaper is applied to a cushion on the sanders with a pressuresensitive adhesive that lets you peel it off easily for quick replacement.

Farther information on these tools can be obtained from:

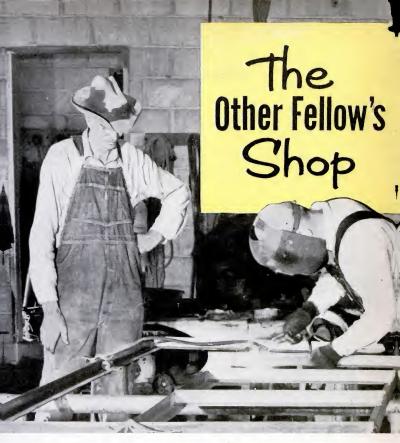
1. Meurs-Rodden Co., 632 East 4th Place, Tatta, Okto.;

2. Mert Products, Inc., 4023 Irving Place, Culver City, Celly;

3. Matter Rule Mg. Co., 9 Mulberry St., Middletonn, Ni.;

4. Indestro Mg. Corp. N. Kildare at Schubert, Chicago 39, Ill.;

5. The Milwaukee File Co., 1867 W. Pierce St., Milwaukee 4, Wis.



Farmer-welder-inventor P. J. Crews has 'em coming from hundreds of miles for his home-grown farm equipment.

By Murrelle Mahoney

IF YOU asked P. J. Crews of Fitzhugh, Okla., whether he is a farmer or welder, he probably wouldn't know. P. J. works at both so successfully that he belies the old saw about Jack-of-all-trades, master-of-none. And the welding trade comes in mighty handy around a farm.

There is always some kind of tinkering to be done, some piece of machinery that needs a bit of fixing. But his real specialty is the original, practical equipment that he designs and turns out in his farm welding shop.

Crews builds cattle guards, metal ranch gates, special types of cattle feeders that don't waste feed, fancy aluminum truck canopies for transporting Shetland ponies. County residents have grown accustomed to seeing his truck coming down the road carrying some peculiar-looking contraption or other. They usually stop to give Crews' latest brain child the once-over.

When he first set up his shop, a few years ago, so many of his neighbors came around wanting something repaired or built that he now devotes most of his time to jobs for other people.

Just What the Doctor Ordered

During the war he even turned his craftsmanship to further the cause of medicine. When fine-tempered steel was hard to get, a bone surgeon in Oklahoma City, where Crews was working in a blacksmith shop, came to see him. His delicate bonescraping tools were wearing out; he wondered if Crews could cony them.

This is the fourth of a series of articles about outstanding home workshops, from which everyone who has a shop may pick up a few helpful pointers.

See Popular Science Monthly next month for a story on another fellow's shop.

"I told him I'd try," says Crews. "They must have been all right, because he came back twice and ordered a dozen more each time."

Lately, however, he has stuck to farm equipment. His current specialty is a V-shaped aluminum stock feeder with trays that catch feed dropped by the cattle. These have proved to be much in demand. With several hundred cattle to feed, ranchers can speed up chow time. Another type of feeder consists of two metal sides, each 20 feet long. The bottom half is sheet metal, and the top is made of open frames at feeding height. Baled hay is placed between the two frames and some 28 or 30 cattle can feed at the same time.

Another unusual item he makes is an aluminum covering for a pickup truck, with a gate and partly open, barred sides for making pony transfers after a sale.

"Most metals absorb heat, and livestock

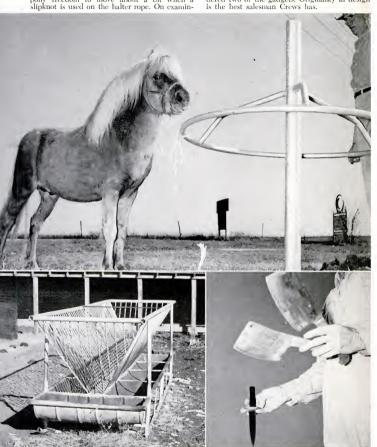
Cattle dehorning is speeded up by this welded gate device. In his right hand Crews is holding the rod that adjusts the height of the neck yoke, or clamp. The lower bar, also adjustable, fits over the nose, thus holding the animal securely while the horns are removed.





Finished side frame of a cattle feeder that is shown being welded in photo on preceding page. When completed, the feeder will have two such sides and two ends. Closed-in bottom part is for feed, open top for bossy's head. Crews' welder-assistant, Jim Holkum, is at right.

Pony tie rack is an original Crews design. A concrete-block base, buried in the ground, makes a solid anchor for the metal center post. The large aluminum hitching ring allows the pony freedom to move about a bit when a slipknot is used on the halter rope. On examining the rack, a recent visitor from Texas, a pony breeder, remarked, "I never saw one like that before." Crews chuckled and agreed, saying, "Neither did I," Before the Texan left he ordered two of the gadgets. Originality in design



V-shaped feeding trough is made of aluminum, except for the side catch-all trays. These are oil drums, split down the middle, and serve to collect feed dropped by careless eaters. The feeder, 18 feet long, can accommodate about two dozen cattle without crowding.

The fighting knife Crews is holding, made of automobile-spring leaves, is called the Paul Jones, after his given names. During the war he made them for soldiers in his Oklahoma City welding shop. Locomotive-spring leaves were the raw material for his butcher's cleavers. Shetland ponies travel in cool comfort under this shiny, heat-reflecting aluminum canopy designed by Crews to fit the bed of a pickup truck. The aluminum top is expensive, about \$300, but then some of the ponies that he raises are worth as much as \$6,000.



Children's playground equipment also comes from the farm welding shop. The teeter-totter is built for toddlers as well as for longer legs. It is easily raised to a higher rung of the ladder. The swing behind it is foot-pedal-operated by one or two youngsters. hauled in summer in ordinary trucks are half cooked by the time they reach their destination," Crews explains. "But aluminum, which reflects heat, makes it much more comfortable inside. You can haul stock for miles under that cover and they keep cool as a cucumber."

Educated Cows Answer School Bell

Used oil drums, pipe, old sucker rods from the oil fields, any useful metal, is grist for his mill. When he needs something to work with that he can't find around, he advertises to buy it. He once advertised for 10 old school bells. Asked what for, he said that he had bought one for himself, set it out on a metal post and used it as a dinner bell for the stock.

"You can train ponies or cattle to come in when you ring the bell," he explains. "They get used to hearing the same kind of noise every day." He laughs. "I guess that's what you'd call an educated cow, if she'll answer the school bell."

Neighbors and some "drop-in" customers from Texas saw the bell and liked the idea. Crews didn't want to sell his, so he thought he'd better buy some more school bells and fix them up.

Crews just can't seem to stay out of the welding business. For years he was a welder in the Frisco Shop in Oklahoma City. He went out on his own in 1943 and opened his own shop. Then, in 1945, he decided to take up farming, bought some land and located at Fitzhugh. The next year he started breeding Shetland ponies, and now has a herd of 30.

Neighbors Put Him in Business

When he got out his welding equipment to do a few jobs for himself around the farm, neighbors came around with various tinkering jobs they needed done. It was so handy not to have to go into town for the work. The next thing he knew, the business had grown until he decided to set up a real shop. He is perfectly content whether building things on order or just carrying out whatever ideas come into his head.

He even has a neighbor weaned over into the welding trade. Jim Holkum, who farms near the Crews place, never had a welding torch in his hand until two years ago. Now he is a full-time worker in the shop, and the two of them keep busy. As long as Crews keeps cooking up ideas, it looks as if they'll stay that way.

Rear-View Mirror Helps Mother Keep Tabs on Sleeping Baby

ONE mother found it easy to check the covers on a sleeping baby by attaching a rear-view auto mirror to the headboard of her bed. She adjusted the mirror so she could see into the crib without getting out of bed, and placed a small night light to help her see clearly.-Alfred I. Tooke, Los Angeles.





No Tipping Allowed Here

To keep a dog from upsetting his food bowl, cut a hole in the bottom of a flat cardboard box like this and force in the bowl until only the rim shows.-Glen F. Stillwell, Manhattan Beach, Calif.

Vibration Starts Ink Flowing

IF you have trouble starting the ink in a ball-point-pen refill, run the point along the serrated edge of the cutter on a box of waxed paper.

This sets up vibrations in the ink chamber, settling the ink and permitting it to flow.-Ken Murray, Colon, Mich.



Sailor Turns Peanuts into People in Miniature-Sculpture Hobby

While serving in the Navy, John Bakowski of New York City filled between-duty hours by fashioning peanuts into people and various other creatures. Finding the right shape of peanut took the longest time, he says.

AUGUST 1954 185





TV Police Tubes' 5 Common Troubles

Unless Junior takes a hammer to it, your TV picture tube will expire for a predictable reason. A serviceman tells how-come.

By Art Margolis

THOSE who gaze into the TV crystal ball predict that some 4,300,000 picture tubes are going to require replacement within the next 12 months, yours possibly among them.

As a TV serviceman, I'll be called upon to haul away many of these glass corpses, and I know from experience that owners will want to know why—especially since replacements cost from \$35 to \$100.

A multitude of catastrophes can befall a picture tube. However, five troubles pretty well cover the field. (Of course, other troubles in the set itself can cause many of these same symptoms; don't throw out that expensive picture tube until you are sure.)

Open filaments. This is the first and most prevalent electronic affliction, and I never know where I will come across it. One day I was called to a prison. The customer was the matron.

The sound on her set was okay, but there was no brightness on the screen. Examination disclosed a bad picture tube. The reason? Open filaments.

But the matron had an "I'm from Missouri" look, so I invited her to crouch beside me while I pointed to the neck of the picture tube protruding from the rear of the set. I explained that normally there is a tiny glow in the transparent glass neck, but in this case the bit of illumination had been extinguished. Just as the filaments in a light bulb burn out, these filaments in the picture tube had opened up. When electricity is pumped through filaments the current makes them do two things. First, they get very hot. Second, they throw off a bright light. In a light bulb we are interested only in the light. But, in a television tube we want heat. In fact, the only job the filaments in a picture tube are required to do is to give off an intense, concentrated heat. That's why they're called the "heaters."

Low emission is another frequent picture-tube disease. I remember a case that occurred in a cheap, run-down hotel. The television set was located in the lobby.

I entered in the middle of a movie. The shades were drawn and the lobby was dark. The only light came from the TV screen if you could stretch a point, for the cowboy actors looked as if they were galloping around in the darkest part of the Calcutta hole.

The filaments were okay in this tube. But surrounding, although not touching, the filaments is another element, the cathode. The job of the filaments is to radiate heat to the cathode. Thus the cathode becomes hot, and due to a special barium oxide coating, spits forth a beam of murderous raw electricity into the vacuum of the picture tube and on into the phosphorous coating on the picture-tube face. The phosphorus reacts by becoming agitated and glowing. We see the glow as brightness on the screen.

Now the question; why the lack of brilliance on this screen? The interior of the picture tube is supposed to be a vacuum. or as close to a vacuum as possible. However, gases collect inside the tube as a result of the electron beam bombarding the metal structures in the tube and vaporizing some of the subsequent chipped-off metals. The gases also come from small deposits of gas that are actually dissolved in the glass or metal picture-tube shell. Anyway, over a period of time these gases collect in sufficient quantity to poison the cathode and reduce its ability to shoot electrons. Also, these gases float around in the vacuum obstructing the cathode ray.

Here in the darkened lobby, the small group was watching a tube with a cathode that could not emit a strong electron beam. The electron ray barely excited the phosphors, and the coating would not take on a bright shine. Turning up the brightness control would only make the whites in the picture begin to shimmer like sparkling quicksilver and then the picture would turn inside out, like a photographic negative. A new tube was the only solution.

Open grid. One evening I was summoned by a young fellow fresh from Scotland, burr and all. I inspected his receiver and noted the symptoms: brightness but no picture.

Brightness is simply the light on the screen, but the picture comes from the various shades of black to gray to white. After the electron ray leaves the cathode and heads out into the wide-open spaces of the picture tube, the ray comes to another element in the structure of the tube, the control grid.



The lady had an "I'm from Missouri" look.

This grid governs the stream of electrons. If the voltage on the grid is strongly negative, it can exert enough force to keep a lot of the weightless electrons from getting to the phosphor screen face. On the other hand, if it is less negative, it will not be able to stop any of the electrons from speeding to their destination.

It follows then, where only a few electrons make it to the phosphor, the phosphor will be harely perturbed and glow only a tiny bit, giving a dark picture. However, if a horde of electrons swarms all over the phosphor, the phosphor will give a bright picture.

The control grid is fed with the picture information in the form of a voltage that



"I'll watch forr a week orr two," he said.

varies with the brightness of the picture being received. This changing voltage makes the control grid either stop the electrons or let them fly in full force, causing light spots and dark spots on the phosphor screen face. These add up to the television picture that you see.

This hapless tube had a busted control grid. With the open grid, there'd be no "Lucy," even though there was plenty of brightness on the screen.

My Scottish customer was taken aback at the disturbing news, but after making sure of the price he gave me the job. He watched me closely while I installed the new tube. As I was leaving he said, "I want to give you something extra forr yourrself. I think you do verra good work, so I will watch the television forr a week orr two and if it plays well, I'll call you on the telephone and you may stop back for the tip."

Fixed brightness. This comes from an internal short in the electron gun, the term designating all of the elements in the picture tube: filaments, cathode and control grid, plus one more element, the accelerator.

The gun operates like this: The filaments heat up the cathode; the cathode, when hot, gives off an electron-cathode ray; the ray reaches the grid; and the grid inserts the television picture information into the ray. At that point, the accelerator takes the cathode ray and accelerates, or shoves, it out into the picture-tube vacuum. Fixed brightness occurs when any or all of these four elements physically touch each other.

In addition, there are bright horizontal lines through the picture which remain uninfluenced by the brightness control. Turn the control all the way up or all the way down—the picture remains at a constantbrilliance level. Remedy: a new tube.

Open cathode. I come across lots of old acquaintances and friends in my TV service travels. One customer, a lady, turned out to be an old Junior High School science teacher of mine.

I turned on the set and noted that there was no brightness at all. The filaments of the picture tube were lit, so I checked to see if any high voltage was being produced by the set. When the electrons leave the electron gun, they are shot towards the phosphor screen face. But they would never complete the journey with enough energy if it weren't for the high voltage. Between 10,000 and 15,000 volts is applied to the outer shell of the picture tube, and this has the ability to suck the electrons violently toward the screen face and dash them against the phosphors.

There was plenty of high voltage here, but there still wasn't any brightness on the screen. I discovered that the internal connection to the cathode of the picture tube was cracked open and would not allow the picture tube to accept the high voltage the set was producing. For the picture tube to be able to accept the high voltage, a complete circuit must be made between the cathode and the shell of the tube. With an

open cathode, the circuit was broken of course.

I stood up and informed my old school-marm that her TV set had a bad picture tube. Then she, using the same inquisitorial tones I remembered from eighth grade, asked me why.

A few days later I received my check. In the envelope was something else—a report card with my name and one subject typed neatly on it. The subject: "TV Service." The grade: "A."



Unlike school days, I was prepared.



Ink Stains Filler to Order

COLORED waterproof drawing inks, available at art-supply stores, will stain natural-color plastic composition wood to match the surrounding woods.

A wide range of shades can be obtained by mixing brown, yellow, red and black inks in different proportions. Apply with a soft brush after the composition wood has hardened and been sanded.



Lock "Kid-Proofs" Appliances

INQUISITIVE youngsters can't plug in a tool or appliance if you slip the shackle of a miniature padlock through one of the holes found in the prongs of practically all male electric plugs. Padlocks of this size are generally used for dog collars and mailboxes.—Sid Corlin, Chicago.

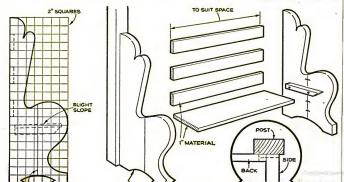
Dutch Seat Provides a Dressy Touch for a Small Porch

Though it may never be used for lounging, this attractive Dutch seat will make your front porch look warm and inviting.

Lay out the profile of the sides on a sheet of wrapping paper ruled into 2" squares and transfer the pattern to the wood. Use two pieces of two-by-eight glued and fastened together with corrugated nails to make the board width needed for each side. Nail the seat to cleats screwed to the sides and nail three one-by-four strips in place for the back rest. Note that the cleats are attached so that the seat slopes slightly to the rear.

Make the seat about 30" wide if it is self-supporting, otherwise make it wide enough to fit between the porch posts, which will brace it and give it the appearance of a built-in unit. Paint it to match the trim of the house.—Hi Sibley, Nuevo, Calif.





How to Build a Tesla Coil





HAVE you ever let 50,000 volts jump through you?

Or seen electric flames climb a wire?

Or made a fluorescent lamp glow by holding it in your hands?

Or built an electric jet motor?

These stunts are a cinch if there is a Tesla coil in the house. One that you can build in a few evenings will do many of the tricks of a million-volt laboratory on a miniature scale.

Nikola Tesla invented the high-voltage, high-frequency transformer about the turn of the century with the idea of broadcasting electric power. It worked. From a 200foot-high transmitter in Colorado Springs he lit lamso over a wide area without wires. But since power was radiated in all directions, most of it was wasted. The Tesla coil went back to the laboratory.

With the age of electronics and nuclear research, cyclotrons, oscilloscopes and other inventions called for just the high-voltage radio frequencies Tesla's rig generated. The Tesla coil came off the shelf, put on working duds, and among other things took a job on television.

The Tesla coil works on the familiar transformer principle—an alternating current in one coil of wire induces a voltage in another coil insulated from but in magnetic coupling with it. A transformer can step voltage up or down. The kind used for toy trains or doorbells steps 115 volts from

the house mains down to a safe 6 to 20 volts. The spark coil in a car-also a transformersteps battery or generator voltage up to 20,000 or 30,000 so that it will jump the

spark-plug gaps.

Voltage gets a big boost. The voltage change is in proportion to the ratio between turns of the input (primary) and output (secondary) windings of the transformer. A Tesla coil has a primary of a few turns of heavy wire, and a secondary of many turns of fine wire.

But what is fed into its primary isn't ordinary AC by a long shot. In the coil shown, for instance, household juice is first boosted to 1,500 volts by an ordinary radio plate-supply transformer. Then this is converted by a one-tube oscillator to a 475 kilocycle frequency (just off the long-wave end of your radio dial). That's what goes into the Tesla primary.

What appears on the secondary seems out of this world. You can't fence it in; it jumps off any edge or point as a fiery brush. Spectacular in appearance, this corona can create enough heat to melt metal and, if concentrated on a sharp point, generates an air blast strong enough to spin a light wheel

or blow a candle flame.

It has two other weird properties-skin effect, and radiation. Household current strikes right through the human body. But Tesla currents oscillate (reverse themselves) so fast that they travel only on the surface of conductors. They go only skin deep; you don't feel a thing.

Such fast oscillations also radiate into space. They can be detected by a receiver tuned to their frequency, and will light neon or fluorescent lamps feet away. Some

ELECTRICAL PARTS LIST (refer to circuit diagram for symbols)

L1: RF transformer primary (see text) L2: RF transformer secondary (see text)

C1: 700 mmfd., 5,000-peak-volt mica capacitor, Sprague 2MC or equal

Sprague 2ML or equal C2: same as C1 C3: 500 mmfd., 5,000-peak-volt ceramic or mica C4: 5,000 mmfd., 5,000-peak-volt mica capacitor, Sprague 2MC or equal R1: 2,500-0m 20-watt wire-wound resistor T1: 6,3-volt, 4-ampere, 2,500-volt insulated filament transformer, 115-volt primary, Stancor P-4019 or

equal T2: 750-0-750 volt 250 m.a. plate transformer, 115-volt primary, Stancor PC-8034 or equal

S1, S2: SPST toggle switch

V1: 811-A vacuum tube 1 ceramic feed-through insulator, ICA #2305 or equal

HARDWARE LIST

1/2 lb. #32 cotton-ename! reulated magnet wire 50' #12 enameled copper wire

1 4-pin tube socket, Amphenol 49-RSS4 1 9/16" plate cap, Millen #55011 or equal 1 alligator clip, ICA #884 or equal

2,000 volts #16 stranded hookup wire insulated for at least

2-conductor "zip" cord

1 2 pole line plug 30" length of Bakelite 1/16" wall tubing, 2" outside

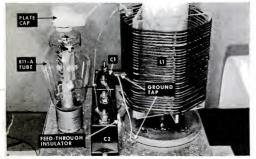
diameter, Insuline or equal 1 pc Plexiglas 51/2" by 14" by 1/8" thick

l oz. cement for Plexiglas

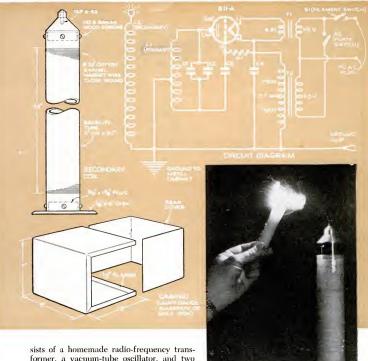
1 pc 22-gauge galvanized steel or aluminum 24" by 24", or box about 7" by 8" by 8"

Miscellaneous: lugs, screws, nuts and sheet-metal screws, metallic household cement or cold autobody solder, plywood, 2" funnel

of these effects are shown in the photos. Ordinary bench tools are all you need to build the Tesla coil shown. The outfit con-



TOP-DECK WIRING shows the ground tap of the Tesla primary soldered to a lug that is clamped under one flangemounting screw. The outside terminals of Cl and C2 are joined by a jumper and connected to the upper terminal of L1. Inside terminals are also connected and go to the feed-through insulator and bottom terminal of L1, Use No. 16 stranded flexible wire for the tube-plate cap, cutting it just long enough to reach without stretching. See text for how to "fire up."



sists of a homemade radio-frequency transformer, a vacuum-tube oscillator, and two ordinary radio power transformers for plate and filament supply. Parts are available from any amateur radio or experimenter's supply house, although the 30" length of Bakelite tubing may have to be ordered. You can save money by shopping for surplus or using scrap-box parts, but stick to the ratings and values given.

Safety is built in. Although Tesla current is harmless, the intermediate power supply can dish out a nasty jolt. Therefore the rig is designed so that exposed parts are either grounded or carry only radio frequency, which may cause a slight burn but cannot shock.

The transformers and other "hot" parts are mounted inside a sheet-metal box. You can make this from galvanized iron or sheet aluminum by bending it up as in the draw-

ELECTRIC WIND. On a sharp point, charge density is so great that it electrifies air before it. The effect is that of a strong air jet, shown blowing a candle flame.

ing, or use stock cabinet of similar size.

Because radio frequencies call for special handling, all top-deck wiring should be No. 12 solid copper, well-soldered at connections, and kept as short as possible. Use lugs to connect wires to terminals. The inside wiring should be No. 16 gauge or heavier, with rubber or plastic-and-fabric insulation rated for at least 2,000 volts.

Brand names are given in the parts list as a help to identification. These happen to be the parts I used, but any make of equivalent quality will do.

[Text continued on page 196]







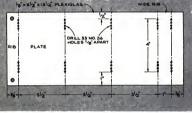
1. CUT TWO PLUGS from thick plywood to fit tightly inside the Bakelite tube. Saw a 4" disk of thinner plywood and attach one plug to it with four wood screws from beneath. Drill and countersink four mounting holes in the disk. Shellac wooden parts before fastening to tube.

2. FOR YOUR WINDING MA-CHINE, clamp a hand drill in a vise, parallel to the bench top, using blocks to give the jaws a firm grip on the drill. Bend up a piece of heavy sheet metal as shown (or fasten an upright piece to a block of wood). Chuck a No. 25 drill and drill a hole in the upright like this.

3. CLAMP THE UPRIGHT 301/2" from the end of the drill chuck and in line with it. Clamp a brace from upright to bench, Fasten one plug into each end of the tube with small wood screws. In the center of the base flange, drive a 2" No. 14 screw. Cut off its head and chuck the shank. Drive a screw through upright into center of the other plug.







of the primary coil. Lay out the parts as shown in the drawing (right, above), making the inside rib 1" wide, and the two outside ones only 1/8" wide. Carefully mark the No. 36 holes 1/8" apart. If you drill them by hand, lightly center-punch each one accurately. On the drill press, a wooden fence clamped to the table, with a locating pin 1/8" from the drill point, can be used as a guide. Run the drill fast but feed down slowly so as not to chip the plastic.

10. REMOVE THE TAPE, solder one end of the No. 12 wire to a lug and fasten it under the lower terminal screw. Then turn the base flange by hand to wind on the primary in the same direction as you did the secondary, laying one turn of the heavy wire into each of the 33 notches all around.3 11. SOLDER THE END of the last lug to the top terminal lug. Use a hot iron, make the joint as quickly as possible, and clap a damp rag onto it to reharden the plastic, which will have softened from the heat. Now apply more cement along all the plate and rib edges to set the wire turns, making certain that each is in its own notch.

12. SCRAPE THE INSULATION off the eleventh turn from the bottom of the coil. A narrow strip of sandpaper pulled between both hands will get under the wire. Push apart adjacent turns a bit if necessary. Then loop the tail of a lug around the bare wire, solder it to this bared turn, and push the spread turns back. The finished transformer can now be removed.







he would walk along New York's waterfront, then swarming with sailing vessels. The giant 10-story-high windjammers from the ports of the world, their canvas spread out, thrilled the youngster. One day he'set up a tripod and shot a ship silhouetted against a sunrise. It won a \$5 prize, parental approval and a year's subscription to an early photo magazine.

After working during several summers for a commercial photographer, Morris Rosenfeld became one of the country's first press photographers. As photographers hotographers. As photographes were often used by artists as a basis for drawing news illustrations. During his newspaper career he set up his tripod at some of the top news breaks of the time: the Russo-Japanese peace conference, Admiral Dewey's parade, the great Baltimore fire. Once Rosenfeld rushed to an editor with a colossal idea—to shoot the Wright brothers as they attempted to fly at Kitty Hawk.

"Rosy, you're absolutely crazy," the editor scoffed. Rosy didn't get his scoop.

Boating Is Big Business

Along with general news, Morris Rosenfeld always kept close to his boyhood love—boats. From 1898 on, he shot the Lipton International Cup Races, as well as thousands of other minor regattas. In 1920 he dropped general news free lancing, and shot boats exclusively. Today he is riding the crest of a boating boom. What used to be a sport of the leisured few is now a major recreation. It takes in Texas cowboys, Minnesota machinists, New York accountants, housewives in Arizona. Pleasure boating is a fabulous 600-million-dollar annual business (5,000,000 boat owners—yachts to peanut-size prams).

And riding the crest with him are two of his sons, Stanley and William, who also are photographers. (A third son, David, teaches photography in a New York vocational high school.)

"It's easy to see why boating is becoming more popular," says Rosenfeld. "It's a sport the whole family can enjoy together, there are less-expensive boats available today, and there's lots more room on the water than along crowded highways."

These new boating enthusiasts now go down to the sea with cameras as well as box lunches. For them, Rosenfeld offers a few photographic tips:



FLYING SPINNAKERS, a Rosenfeld masterpiece, is probably the best-known boat photograph ever made. It was snapped in 20 minutes, has paid him handsomely in royalties.

 On shooting action: "To get boats in speed racing, you have to shoot fast enough so that the picture is not blurred, but not so fast as to freeze all action, making sea spray, for instance, appear as a mass of individual droplets."

 On lighting: "You have to keep your eyes peeled for variations of effects. It is 360 degrees around the horizon, so place the boat in a part of the sky where you can use the direction of the light either to silhouette the subject or for modeling to bring out shape and form, such as billowing sails."

 On lens care: "If you're shooting from a fast-moving boat and the lens gets wet with salty water, rub it gently with lens tissue; otherwise the salty particles will scratch the lens."

 On filters: "Use medium-yellow ones. They give you the sky tones and will accentuate the clouds. They also protect the lens against salty spray."

• On shooting within a boat: "Expressions are significant. The hands, bodies and gestures of the people aboard are important. The smaller the boat, the more significant the little actions and gestures. And the best shots are not always the violent ones. A baby sleeping or someone resting in the sun can be equally effective."

Hydrojet Powers Little

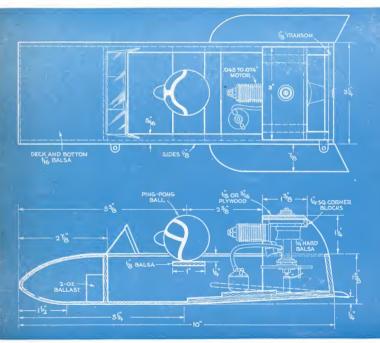
Newest thing in nautical propulsion, this clever midget boat has no weed-snagging paddles or prop—won't nip unwary fingers.

By Roy Clough

HERE'S a little boat that skims over the water like a speedy sea sled, riding high on two rocket-like chine planes. Yet when you pick it up you'll find no fingernipping propeller underneath. The only clue to its hidden power is the intake port on the bottom, and an exhaust port directly behind

it at the stern. Housed in a casing between them is a rotary pump which draws in water and kicks it backward at high speed. Reaction to this stream drives the boat.

The hull. Use "" sheet balsa for the sides, bulkhead, transom (stern), pilot's-head support and chine planes. Thinner balsa serves for the bottom, deck and gunwales. Before decking in the bow be sure to



The machine weighs 86 pounds. Its pilot weighs 210. It flies handily at 25 miles an hour. It will land at seven miles an hour. The thing was built by an engineer-scientist named Igor Bensen. He says that practically anyone could build one. The estimated cost: \$100.

Bensen's aircraft is a sort of Whatzit of aviation. It isn't an airplane—its wings revolve. It isn't a true helicopter—no power is applied to its rotor. It isn't an

Autogiro—it has no propeller.

In flight it looks like a precocious pinwheel or—to borrow a phrase—an agitated palm tree, dwarf size. Its builder calls it a "Gyro-glider." Anyone watching it fly might settle for "rotary-wing kite."

Bensen's Self-Starter-the Wind

It flies, in fact, much like a kite. In light winds, it is pulled aloft by a cable tied to an automobile. In brisk winds, it can be flown by tethering it to a fence post. Slap the rotor to start it, push on the control handle, and up you go.

"Flying this machine," says Bensen, a licensed pilot, "is the nearest thing to flying like a bird that I've ever experienced. There's no structure around you. There's no noise."

With a 300-foot cable or strong rope, the Gyro-glider can be soared to an altiDESIGNER WEARS STEEL-SHOD SHOES so he can use feet for balance and braking when landing. In free flight, kite will descend slower than a parachute, but it takes practice to master the single control.



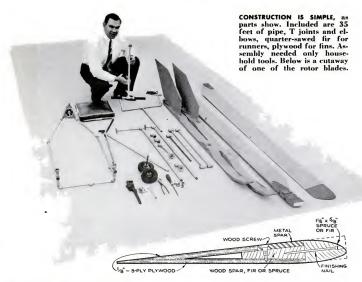
tude of 150 feet, about the height of a 12-story building. But that's tops. Beyond that, the upward pull of the rotor and the downward pull of the tow tend to "buffet" or vibrate the machine and make control difficult.

On Bensen's testimony, the Cyroglider is not hard to fly. Fore-and-aft, he says, it's quite stable. Sidewise, it's something else. It takes practice to overcome the inherent skittishness of the machine laterally. There is only one control for flying. On the prototype gyro this is a yoke, a loop of steel tubing. Whether a federal license will be needed to fly the thing has not been decided.

The lifting surfaces are two long, flexible blades, shaped like those of a helicopter and mounted on a single bearing that lets them teeter-totter in rotating. The teeter-tottering, plus manipulation of the control yoke, balance out the lift of the blade advancing into the wind and the lift of the blade retreating from the wind. Without such compensation,

WATER-PIPE VERSION of helicopter kite has standard six-inch ball-bearing wheels in front, roller-skate wheels in rear. Bensen is revising undercarriage to make it a three-wheeler. Small fins give directional stability. Sea toushion was bought at Sears, Roebuck. Machine's height is 64 inches, width 50, length 80. Weight is 86 lb., rotor diameter 20 feet.





the machine would tend to capsize—the advancing blade creates more lift.

The rotating blades form a disk, slightly dished, with their tips a bit higher than their roots. Centrifugal force wants to hold them straight. The pendulum-like weight of the "fuselage" and pilot wants to dish them. The result is a compromise.

The plane of the disk's rotation can be changed, and that, in fact, is all there is to the control. Push the yoke forward, and the disk tips backward like a straw hat clapped on the back of the head. That makes the gyro climb, Pull the yoke back, and the disk tips forward. That makes it coast downward.

Gyro Lands Like a Plane

Pushing the yoke sideways upsets the balanced lift of the blades as they sweep through the two side quadrants of the circle they describe around the hub. That causes the machine to move sideways.

To land, the machine is coasted to the ground and, in a light wind, "flared out"

like an airplane with the disk tilted back. In a strong wind, the machine is "flown onto" the ground, disk about level, again like an airplane.

Like all blades on rotary-wing aircraft—and like the fixed wings of airplanes, for that matter—that of the gyro is a true airfoil, with a bulbous leading edge, a hump on top and a taper to a knife-edge at the back. The blades lift as they rotate because of Bernoulli's theorem—the air has to speed up to get over the hump. That thins it, and the air beneath the blade pushes up to fill the semivacuum. This upward push is lift.

Wind rotates the blades, as a gust of air will rotate an idle electric fan. The blades can't stop in flight. If the horizontal velocity of the wind doesn't keep them going, its vertical velocity, caused by descent, will.

The real beauty of the Gyro-glider, according to Bensen, is that it takes no precision to build it. The skimpy structure beneath the rotor of his prototype is made of welded steel tubing. But that on his second machine, put together to see how inexpensively it could be built, is largely galvanized water pipe. His rotor blades are plywood and solid fir, reinforced with a strip of steel an eighth of an inch thick and two inches wide.

To prove that the blades can be built in a home workshop, Bensen made a pair of them with leading edges of ordinary half-round bought at the nearcst lumberyard. It worked pretty well, but he isn't recommending it. More care devoted to blade shape pays off in increased lift.

"Eye" for U-Boat Wolf Pack

Bensen's acquaintance with aircrafton-a-string began in World War II when the U. S. Navy liberated some of them from the Germans. U-boat commanders were using them as crow's nests. Paid out on a cable, the rotary-wing kites reported by telephone on the pickings in Allied shipping. This was relayed to the submarine wolf packs. The kites were reeled in, dismantled and stowed below, and the U-boats were ready for business.

"Of course," recounts Bensen, Russianborn but U. S.-educated, "the things were typically German—they had aircraft-type controls, flapping hinges on the rotor, and other complications."

Working at the time for General Electric, Bensen built and flew his first gyro in 1945. It did everything the German version would do, and it was simpler. Bensen went on to more important research jobs for GE and, later, for a Connecticut helicopter company. But he kept the design of the aircraft-on-astring in the back of his head.

He had a reason. In Hartford he had helped form a model-aircraft club for boys. All the youngsters wanted to fly, but airplanes and gliders were prohibitively expensive. When, finally, he established his own helicopter company in North Carolina, he began designing a tethered rotary-wing machine as a gift to the boys' club.

The gyro is a sideline to Bensen's main business—which is the development of a single-place, military-type helicopter with a novel means of propulsion.



SWIVELING WHEEL on front of welded prototype kite allows steering on ground. Pilot's left hand holds handle to release towing cable. Keel was made from an old ski.



ALUMINUM HUB PLATE secures rotor to shaft. Bearing is floated on a rubber mount to permit tilting for control. Steel-plate portions of assembly were cut from machine-shop scraps.

Yet he takes an open delight in flying the machine and likes to tell about how it cost him money. Before the first flight, his mechanics laid bets on the sly that the thing would never fly. As fast as the money was offered, the engineers covered it. Bensen didn't hear about it until after he had gone up and come down again.

He wishes now that he had known.
He had a sure thing.

In Popular Science next month: How to build a flying model of the helicopter kite.

0100010

Dummy "Killed" In Smashed-Up Car Could Be You



Test car being towed into position for the crash run.



As car smashes into barrier, signals from recording devices are sent through cable at rear.



One "dies," one is saved by shoulder harness.

A CAR going 25 miles an hour smashed into a solid barrier of telephone poles the other day. The front-seat passenger was killed. His ribs were broken, his neck fractured, his vertebrae driven together. The driver escaped with cracked knees.

Fortunately, the occupants of this car, deliberately cracked up, were dummies. The driver was protected by a new shoulder harness. The passenger rode like most of us, without a restraining belt. A total of 36 measuring devices and a high-speed movie camera told the story of what happened to the dummies and to the car.

This crash research is being carried on by experts at the University of California at Los Angeles to find out how cars might be made safer and the occupants protected.



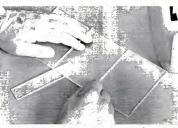




4. TUBE SHOULD TURN freely and run true if centers are well located. An inch from the base, tape the end of the No. 32 wire securely and wind on a few turns, evenly and without overlap. Then mount the spool of wire on a dowel clamped within easy reach. Put a heavy glove on the hand that will feed the wire.

5. IF YOU HAVE A LATHE, you can wind with power. Use back gears to get about 150 r.p.m. Keep your hand well back from the tube as shown, angling it about 5° behind the winding point. If the wire overlaps or leaves a gap, go back and rewind it evenly. Apply just enough drag to keep the wire taut; avoid jerks that may snap it. The supply reel is best mounted several feet behind you.

6. AFTER WINDING 28" of coil, secure the wire with tape. Solder the coil end to a lng secured under one of the wood screws holding top plug. This completes the secondary coil, but do not remove it from winding rig.



8. WITH A THIN-BLADED SAW, cut ribs and plates apart through the centerline of the holes, which will leave notches along 4" of the cut edges. The wide rib will have notches on both edges, so cut off one edge to make it the same width as the others. Hinge plates together with tape.



9. WRAP THE PLATES around the secondary with notches for first primary turn 1" above bottom of the secondary. Tape the corners, then apply plastic cement to edges. Center the ribs on the plates and cement edges, being careful that all notches line up.

13. ALUMINUM FUNNEL
forms the secondary cap.
Lay it on a flat surface
and scribe around it at a
diameter of 2". Mark off
a ½"-wide connecting tab.
Trim off the rolled edge
except at the tab. Then
cut exactly on the line. File
off any slivers in order to
leave the edge as smooth
as possible.

14. CUT THE NECK of the furnel to ½2" in length. Drive in a dowel and hammer the neck over it to a rounded tip, leaving a ½" hole in the center. Attach the cap with aluminum cement or body solder, with its tab under the secondary terminal screw. File edges smooth to reduce corona leakage.

15. SEEN FROM BEHIND, the tube socket, at back of top deck, has pins 1 and 4 to the rear. Tesla coil is mounted with primary terminals and ground tap toward the rear. Capacitors Cl and C2 are close together, with the feed-through insulator between them and the coil. Plate transformer is inside, filament transformer (in hand) behind it. (Please turn the page.)





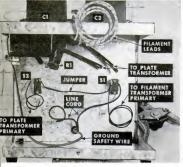




MARK MOUNTING HOLES with a longpointed pencil, back up the sheet metal with wood, punch the centers, and drill. Spot holes for filament capacitor C4 so that it can be mounted upside down under rear corner of top deck near tube pins 3 and 4 as in photo below. If you have no chassis punch, make hole for tube socket by drilling a circle of small ones and filing between.



THIS UNDER VIEW of the top deck shows the ground connection for C4 soldered to a lug under one mounting screw. Grid-leak resistor R1 is connected to the other terminal of C4, along with a wire to tube pin 4. The grid capacitor, C3, goes between the other side of R1 (also hooked to pin 3) and the feed-through insulator. Leads from C4 to plate transformer must be high-tension ignition cable. Use No. 12 stranded wire with high-grade insulation from pins 1 and 4 to filament transformer. Pin 2 is not used.



The RF transformer. This is the heart of the Tesla coil and somewhat critical. Make no changes or substitutions if you can possibly avoid them. Since the primary coil is built up over the secondary, all operations should be in the sequence shown in the photos.

Firing up. First ground the power-cable clip, both as a safety measure and to minimize the possibility of radio interference, and plug in power cable. Insert the tube and connect its plate cap. Do not connect anything to the secondary coil terminal.

Turn on the filament switch. The tube should light. Holding a fluorescent lamp a few inches from the coil, turn on the plate switch. The lamp should glow. If it does not, turn the power off and check the wiring.

If the lamp glows, turn off the plate switch and stick a short piece of No. 12 wire into the hole in the terminal. When plate current is switched on, a crackling fistful of sparks should sprout from the end of the wire.

Metallic objects may be held directly in the hand and the sparks allowed to jump to the metal. Do not bring the hand itself close enough to the terminal to draw sparks; although there is no shock, they do cause small burns. Partially insulated objects should be held by a long plastic rod so that the potential will not jump through the insulation to your hand.

Trouble shooting. If the wiring is right and the tube is good but only a small spark appears, the secondary coil is probably off specifications. This means the circuits will be out of tune, and not oscillating properly. Rather than trying to doctor the coil, you can tune the circuits by juggling the value of capacitor C1, which with C2 controls oscillator frequency.

Try a value of 50 mmfd. larger or smaller than the 700 mmfd. specified for C1, and check coil action again. Odd values for C1 may be built up by paralleling several

[Continued on page 234]

POWER WIRING and switches as seen from rear of front panel look like this. The ground safety wire goes to the grounded terminal of C4. One side of the line cord from the AC plug is connected to the filament switch, S1. The other side of the line cord goes to one side of both transformer primaries. Cross connection of the two switches by the jumper as shown in the diagram makes it impossible to turn on the plate transformer until tube filament is on.



LOOK, MA, NO WINGS! Revolving blades alone hoist this frisky model on the breeze. Inspired by Igor Bensen's man-carrying gyro-kite (right), it has two contra-rotating rotors for stability.

Here is the liveliest aircraft-on-a-string you have ever flown. It's a cinch to put it together from balsa, wire and cardboard.

By Roy L. Clough

MUCH more fun to fly than an ordinary kite, this gyro-glider gets up in a moderate breeze and rides steadily aloft, rotors plopping about like a helicopter's.

Instead of a single tilting rotor like Igor Bensen's man-carrying machine (PSM, July '54, p. 98), which requires a pilot on board, this model has two semirigid coaxial rotors. These turn in opposite directions, keeping gyroscopic and lift forces in balance. A mast-mounted fin prevents suddenwind shifts from tipping the model over, while a boom-mounted tail takes over the pilot's function of keeping the rotors at the correct angle to the wind.

Build cabin first. Cement %"-square balsa sticks together as shown in the drawing on page 199 to make the cabin, doubling them for the front strut and rear cross member. Reinforce the corners with gussets of %" sheet balsa. The apex through which the rotor shaft passes may be built up of

AUGUST 1954 197



IT SPINS AS IT FLIES. There's action aplenty with both rotors whirling rapidly when the kite is up. Gusts will drop it a few feet or cause some rolling, but the craft regains flying trim so long as it has enough altitude.



TOO SKINNY TO FLY? There doesn't seem to be enough wing area for the breeze to lift it. but when the rotors start spinning the model is eager to climb. Landings are best made by hand: kite is unstable close to ground.

three gussets and a cap, or carved from a bit of hard balsa.

The tail boom, also two ""-square members, is cemented on top of the rear crosspiece but behind the middle one. This gives it an upward slope. Cut the tail out of 1/16" sheet as shown, score it down the center, break and recement to give a dihedral of 3" under each tip. Cement it to the boom with a wedge between, as shown.

Wheels may be from a model airplane or a toy, and of course need not turn. Cut out the pilot and his seat from stiff cardboard. Cement the figure slightly off center to let the rotor shaft pass.

Making the rotors. Secure the rotor shaft from turning either by bending the lower end over and lashing it to the boom, or by soldering it to a bit of tin plate clipped around the boom as shown in the photo.

Make the rotor mounts from \" lengths of brass tubing, tin-plate clips, and 3/32" steel wire as in the drawing. Compensate for the off-center mounting by bending the wire slightly. Use acid-core solder for a good bond with the steel, but wash the joints afterward with baking-soda solution. Solder tin-plate clips to the rotor mounts at a right-hand pitch on one rotor and a lefthand on the other.

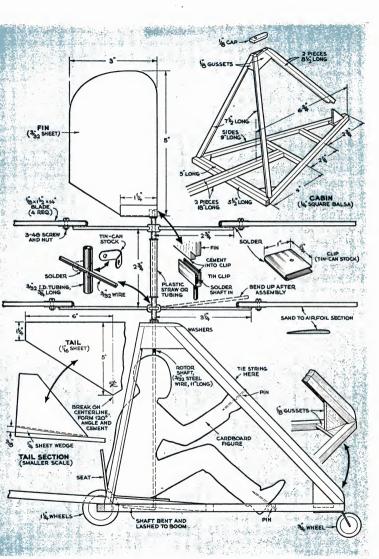
Use small washers and a piece of plastic tubing between the hubs to insure free turning. Solder a washer above the lower



ROTOR SHAFT is stationary, with metal clip for fin soldered to top. Rotors must spin freely. Upper wire mount of rotor is bent to form a dihedral, with about $4\frac{1}{2}$ " between rotor tips. Bottom view of cabin (right, above) shows lower shaft end fixed against



rotation. Tin-can clip with a hole in it is crimped around tail boom. Shaft, pushed through hole, is soldered to clip. Rear wheels are pinned to back frame member; front one is mounted in wire yoke lashed to frame and cemented. Wheels do not turn.



rotor hub to the shaft so that the weight of the top rotor rests on the washer, not on the lower hub. Make four blades of 3° balsa, sanding them to a uniform airfoil section. Bolt them into the clips, and bend up the upper blade mounts to separate the tips of the two rotors by $4\frac{1}{2}^{\circ}$ or 5° . This prevents blade clash and minimizes interference due to rotor wash.

Do not try to simplify the rotors by using a solid wooden hub. The spring wire mounts take the place of drag dampers in the real thing; whout them, the blades would shatter in anything more than a mild breeze.

The fin clip at the top of the shaft retains the rotors. Be sure it is aligned with the tail boom; then cement the fin into place and squeeze the clip around it.

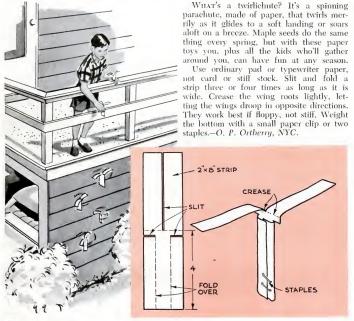
How to fly it. Tie strong kite string to the front cabin strut just above the pilot's

arm. In a moderate breeze, hold the model at about 45° to the wind and let the rotors come up to speed. When both are spinning as fast as they will go, release the model and quickly pay out a few feet of line to let it reach its own equilibrium. If everything is right it should continue to rise, with the rotors spinning freely, until it reaches its ceiling. This is determined by the weight of the string, the wind velocity and where you tie the bridle.

Should the model tend to roll over, first check the alignment of the tail and fin. If this is correct, one rotor is probably turning faster than the other.

Twist a bit more pitch into the slow rotor by bending the blade clips gently. For top lifting efficiency, however, keep the pitch of both rotors as small as is consistent with fairly high turning speed. END

Twirlichutes Are Fun to Sail, Take Only 30 Seconds to Make



A knockdown table of plywood is handy for roadside picnics or camp meals. Cut the top to fit the car trunk and screw floor flanges to the underside to take legs of iron pipe. Store it near your kitchen and it will do temporary duty when more counter space is needed.

To store an ice pick away from small hands but within easy reach of your own, slip it through a couple of scree yess et conveniently in the wall alongside your refrigerator or freezer.



KEEPING THE

Home



If the catch rattles when an interior door is closed, a small pad of sponge rubber cemented to one leaf of each hinge will quiet it. A spongerubber powder puff will supply more than enough of the material needed for the job.



Freezing your harvest? An old-fashioned electric curling iron can speed the work. Faster than a pressing iron, it seals the plastic bags while they stand upright. Use only moderate heat.





Pop go the wieners, three or four at a time, if you roast them by shaking them over the fire in a corn popper. Caged in wire, not a frank is ever lost in the flames.



A portable clothes dryer for motel-hopping travelers can be made by binding together two wire hangers and a cake-cooling rack. Lash the parts with cord or wire, keeping it loose enough to allow the dryer to fold flat when it is not in use.

A too-short pump will reach the last of the insecticide in a spray bottle if you lengthen it by adding a piece of drinking straw or by wrapping it with tape.



Agitate the wash with an old vacuum cleaner if your summer cabin has no washing machine. Switch the hose to blower end, insert curved metal nozzle and metal tubing, and lower into tub.





side seam and opened part way at ends. Flap bent back and

cut in at sides forms handle trough. Brace it with plywood

and screw top of can to wall.

-202 POPULAR SCIENCE



Screws Wax-Dipped in Quantity

To coat screws for driving into hard-wood, dissolve some paraffin, dip the thread into it, and hang them between wires on a wood frame like this to dry. Melted wax or soap paste can also be used.—Clinton R. Hull, Costa Mesa, Calif.

Keeping an Eye on the Pupils

A REAR-VIEW mirror mounted over the blackboard enables one teacher to keep an eye on the pupils with her back turned.



One-Boy Seesaw Hooks to House

A SHORT plank hinged to the side of the house and held by a strong spring will give a child a lot of fun on days when there's no one around to play with. Use a two-by-eight about 5' long and pad the seat end with cloth or burlap. Make sure the screw eye is firmly attached to the house.—V. H. Lamoy, Upper Jay, N. Y.



ECONOMICAL conversion instead of costly rebuilding has improved the utility of our wooden-body station wagon. For an outlay of \$55.60 we now have a vehicle with pick-up-truck capacity and passenger-car riding qualities.

The photos show what we started with —and what we now have.

All decayed wood was stripped away from the rear of the body and the rotted

part of the top sliced off. Side sweeps shaped from %" exterior plywood were then installed in the rear body panels. Stanchions at the rear corners were cut off at tailboard height. Other changes included a bulkhead behind the middle seat and a plate across the end of the cut-off top. Removal of the rear seat from the vehicle gives us easily accessible rear cargo space.—Bill Knodt Jr., Essexuille, Mich.



With a steady boost from your auto battery, the dry cells in your flashlight will give you a good light and last a long time.

A GOOD flashlight can be a lifesaver on the road—but one that has been cooking in a hot glove compartment for months may let you down.

This home-rigged flashlight has two slick tricks up its sleeve. In the car, it travels on a mount hooked to the electrical system. This keeps the dry cells up to strength much longer than usual. A powerful magnet bolted to the flashlight case both holds it in the mount and lets you stick it to any steel part of the car, leaving hands free.

The reviving gimmick. It's a fact that dry cells can generally be kept at full strength longer by feeding them a little direct current between periods of use. This is not like the recharging of a storage battery, and it will not restore dead cells. But it will stretch cell life considerably.

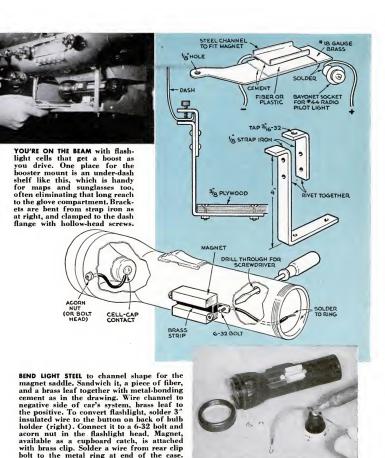
Begin with a plastic or rubber-cased

flashlight using two standard D cells. (You need an insulated case because a metal one would short out the magnet and bolt that serve as the booster contacts.)

Building the mount. I keep my light on an open shelf under the dash. The magnet snaps onto a small steel channel, and a brass leaf insulated from it touches the bolt on the case. A No. 44 radio pilot bulb in the circuit limits boosting current to about 100 milliamperes, and also indicates the condition of the cells. Do not use any other bulb.

Connect the brass leaf to the positive and the magnet saddle to the negative side of the car's electrical system. If you don't know which is grounded in your car, see whether the battery posts are marked and which has the ground strap on it. If this doesn't show, assemble the rig and put the flashlight in place, its switch off. Then ground one wire and just flick the other on a live terminal.

If the pilot bulb flares brightly, reverse the booster leads. With good cells, it should just glow yellow-orange when correctly

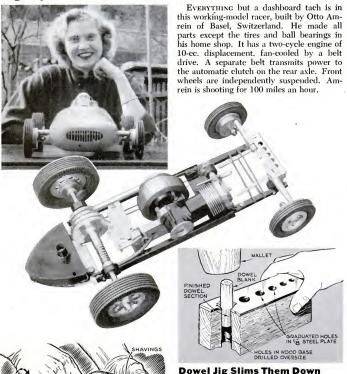


hooked up. For permanent connection, take the hot lead from something constantly energized, like the cigarette lighter. Don't tap the switched side of the ignition, for with the key off, the dry cells will drain back through the dash gauges. An on-off switch is optional; you can simply put the light on its mount backwards to take it off the booster line.

Checking cell condition. Run-down

cells have lower internal resistance than fresh ones, and will let the pilot burn yellow-white. As they come up to strength, the pilot should dim. But with worthless cells, it will glow brightly even after long boosting. To protect the flashlight bulb, don't turn it on when the case is in its mount. Avoid letting the magnet and contact bolt touch metal simultaneously, as this shorts the cells.—Hugh Smileu Ir., Henniker, N. H.

High-Speed Model Racing Car Is Fitted with Clutch and Fan



Jar Catches Pencil Shavings

AND PENCIL

SHARPENER

MOUNTED on the inside of a metal jar top, a hand pencil sharpener is easier to use, and the jar catches the shavings. Run two self-tapping screws through the lid into holes drilled in the end of the sharpener. Drill a %" hole to admit the pencil,—Rufus P. Turner, Los Angeles.

press or a mallet. When the edges of the steel-plate holes become dulled, new cutting edges may be established by re-drilling each one with a drill one size larger than the original.-J. E. Cushman, Stonington, Conn.

Oversize or out-of-round dowel stock can be salvaged with this jig. You can also make your own dowels, in various sizes, from wood of irregular section.

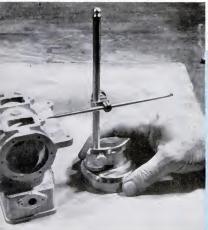
The jig consists of a steel plate, with

holes of graduated size, screwed to a wood

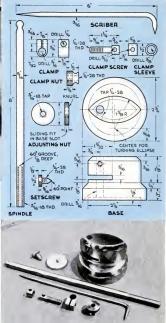
block. Oversize holes in the block provide

clearance for the dowels being formed.

Stock is forced through the jig with an arbor



NEW Shop Ideas



Surface Gauge Is Lathe Project. Any modelmaker or machinist needs a surface gauge to scribe layout marks on many work pieces. Making one ordinarily calls for a shaper or miller, but this gauge can be made entirely in your lathe.

Turn the base from a chunk of 2%" coldrolled steel rod. Face the bottom and cut a bevel %" up from the bottom surface to form the round part of the base. Then chuck the base 13/16" off center in a four-jaw chuck and turn one-half of the elliptical upper part. Loosen two jaws slightly and rotate the base 180° in the chuck to turn the other half of the ellipse. Drill holes for the spindle and setscrew and cut a 3/16" slot for the adjusting nut. Use a milling attachment to cut this slot parallel with the bottom, or else cut it with a hacksaw and file it smooth.

Turn the clamp screw, sleeve, spindle and knurled nuts from short pieces of coldrolled rod. After threading the spindle, cut a V groove in it by forcing a threading bit laterally along its side while it is in the lathe. Clamp the bit on its side in the tool holder and make several passes until the groove is %" deep.

Make a 3/16"-diameter hook scriber from a 6" length of drill rod. File the scriber clamp from a small block of mild steel, leaving only a thin wall around the spindle hole so it will spring easily when the clamp

nut is tightened to lock it on the spindle.

Slip the adjusting nut in the slotted base and twist the spindle down into it. Screw the pointed setscrew into the tapped hole in the base and turn the spindle so that the point of the screw enters the V groove, preventing the spindle from turning.

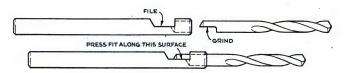
In use, set the gauge to the approximate height by sliding the scriber up or down the spindle on its clamp. Then make the fine adjustment by rotating the adjusting nut to move the spindle up or down, bringing the scriber into the precise setting desired.—Will Thomas, Buffalo, N. Y.



Screw Head Countersinks Inside Holes. Cut off half the head of a flathead steel wood screw and chuck it in an electric drill to make an improvised tool for countersinking holes in hard-to-reach places. No clearance angles are needed; the tool acts like a scraper, producing a smooth countersink. It will work well on brass and aluminum, but should be case-hardened for other metals. —John J. McGuckin, Ridgewood, N. J.

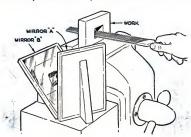


Make Your Own Layout Blue. Get a sheet of hectograph paper at a stationer's and cut a quarter of it into small pieces. Soak the pieces in 2 oz. of alcohol to dissolve the aniline coating and drain it into a clean screw-cap bottle. Add a tablespoon of shellac to give it body. This solution will dry instantly on metal surfaces, leaving a deep purple film that won't flake off when scribed.—J. M. Finn, Pittstown, N. J.



Drill Extensions Are Removable. Grind an offset on the shank end of a drill and fit it into a matching hole drilled in a length of steel rod of slightly larger diameter. File away half the rod just above the hole

to engage the offset on the drill shank. This way, your drills can reach into hard-to-get-at places and still be available for regular drilling operations.—Fred Barker, Ilion, N. Y.



Mirrors Ease Filing Operations.
Instead of stooping frequently to check your progress when filing to a line, arrange a pair of mirrors beside the vise to reflect the image of the workpiece up to you. Mount the mirrors on a block of wood so that mirror A reflects the image to mirror B, which then reflects it upward. The image is reversed by the first mirror and re-reversed by the second one, presenting the true image to your eye.—Federico Strasser, Santiago, Chile.



Sanding Thins Down a Washer

If you must reduce the thickness of a washer, spacing ring or similar part by a small amount, place it on a sheet of abrasive and rub with a sanding block. This stunt is also useful for putting a fine finish on flat metal parts used in craftwork.-Walter E. Burton, Akron, Ohio,



Tire Rims Support Oil Drum

Two demountable tire rims obtained from an auto junk yard gave me the makings for a useful oil-drum stand.

The rims were cut into two equal arcs. Then the arcs were turned back to back and welded together. The two rim assemblies were fastened by an iron rod welded between them.-Harry Sloan, Oswego, Kan.

Alarm Ring Identifies Circuits

Unmarked fuse boxes can be a nuisance when you want to cut out one of a number of house circuits for repairs. You can save running up- and downstairs by plugging an electric alarm clock into the circuit to be worked on, and letting it ring while you back out the fuses, one at a time. You've got the right fuse when the alarm shuts off.-Roger Sessler, Jamaica, N. Y.



Clock Face Helps Draw Star

THE face of an old clock is a handy aid for drawing a star or dividing a circle into any number of equal parts up to 60.

To lay out the points of a star, place the clock face on the center dot on paper and make a mark every 12 minutes. Draw lines from the center point through these marks and connect them to form the points.-Ken Olin, Marquette, Mich.

Is the Basement Door Locked?

When you are closing up the house for the night, do you always wonder whether the basement door is locked? To save myself a lot of steps, I rigged



FORMS

CONTACT

ONE

WIRE

OF BRASS

TOHEAD

supplies power for If there is a steam or water pipe handy, you won't have to string a second wire to the first floor. Let the pipe do the job .-W. C. Irving, Silver Spring, Md. AUGUST 1954 209

Jeep-Mounted Ladder Gets the Apples



ENGINEERING is Hugh A. Mills' business and he applied its time-saving principles to the job of picking apples on his farm. Putting the ladder on a jeep gets the job done twice as fast.

The ladder feet have prongs that fit in holes in the bumper and are secured by cotter pins. The prongs are just %" lag screws with their heads sawed off and their ends drilled for the pins. Guy wires to the body hold the ladder up.—
Benjamin West, New Canaan, Conn.



PSM Reader Builds Six-Cylinder Version of Radial Vacuum Engine

TAKING his skills as a machinist home with him to use in his hobby, Waldemar G. Hansen of Los Angeles built five copies of PSM's Mystery Engine (Feb., '50, p. 206). Two cylinders, he thought, would be better

than one. So he made a couple of two-cylinder engines of the same kind. His most ambitious project yet is this six-cylinder radial job. It is fired by six gas jets and is said to be instant-starting.



A FLAME BURNS before each cylinder port. Sliding valves, which close the ports after hot gases are drawn in, are driven by a single eam. As gases cool and shrink inside the cylinders, atmospheric pressure drives pistons inward. The flywheel is from a sewing machine. Close-up below shows the six-lobed master connecting rod to which the other five are hinged. Circular pipe carries gas.



Trash-Can Stand Keeps Yard Neat

This good-looking stand spruces up the back yard, keeps neighborhood pooches from knocking the trash can over, and has a quick-release catch to keep hurried garbage collectors happy.

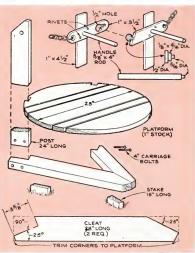
The stakes, cleats and uprights are all two-by-four stock. Cut the two cleats to shape, and drill holes at each notched end for ½" bolts.

Drive the three stakes into the ground under the V formed by the cleats, mark the stakes with a level and cut them off square. Fit a 3' disk of tar paper over the stakes, then nail the cleats on.

Bolt on uprights. Nail random widths of 1" stock temporarily together, a wide piece outside. Cut the round platform to shape, notch wide piece for uprights, and renail pieces to staked cleats.—Vern Forsberg, Seattle, Wash.







Easy-to-Make Fiber Jaws Keep Pliers from Marring Metal Parts

ONE day while working with some small brass pieces it occurred to me that I could use a tool I had never seen—a pair of pliers with fiber jaws. Two bits of red fiber 1/16" thick cemented to variable-axis

pliers gave me exactly the tool I wanted. Use one of those stick-to-anything cements for the job. To allow for the fiber thickness, open the pliers in the second axis.—
R. L. Clough Jr., Bristol, N. H.



CRAFTSMEN AT WORK

Twin-Hull Boat. One of the strangest, but most comfortable, craft navigating the Portage Lakes near Akron, Ohio, this summer is a motorboat whose twin hulls were once an Air Force bomber's fuel tanks. The boat was built by George Charles of Tallmadge, Ohio.

A 6-hp. outboard mounted between the stern ends of the fuel tanks drives the craft at about 15 m.p.h. A tiller that can be manipulated from the deck provides steering. Hatches give access to the two hull tanks for storage.

Radio in the Cupboard. Radios have found their way into just about everything but the kitchen sink—and below is one that almost made even that. Using parts of three sets, Daniel P. Pomponio of Berlin, N.J., installed the radio in the drawer of his wife's corner kitchen cabinet. An outward-sloping panel allows the tuning push buttons to be adjusted from a standing position. Chrome bars cover the speaker.





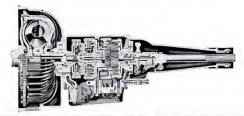
Observatory on Wheels. This 20" Cassegrainian reflector telescope, built by Frank W. Manning of New Orleans, rides to a viewing site on an all-welded trailer. It is then unhitched and leveled by means of three car jacks. An electric drive turns the large gear on the polar axis, synchronizing the telescope swing with star movement.

The 20"-diameter main mirror is a Pyrex disk, 4" thick. Its focal length is 100". Six iron disks, totaling 500 lb., balance the instrument on the declination axis. The finder, mounted near the eyepiece, is a 3" refractor telescope.



Of all automatic drives in the low-price field:

Fordomatic is





Gives you that extra "Go." Simply press down on the accelerator at any speed up to 58 mph and you get nearly 50% extra passing power with Fordomatic's automatic intermediate gear. Only Ford in its field has it.



Gives you smoother braking down hill. When selector is moved to low at speeds above 25 mph, Fordomatic goes into intermediate gear until speed falls below 25, then goes into low . . . for smoother, extra-sure braking.



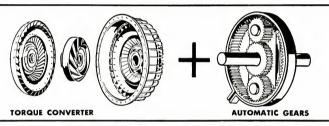
Provides an extra measure of safety. Fordomatic lets you go from neutral to reverse without having to pass through a forward drive position. Selector must always be in neutral (N) before starter will operate.

Worth more when you buy it . . . Worth more when you sell it!



the most versatile

Fordomatic combines a simple 3-element torque converter with a 3-speed planetary gear system to provide the widest range of fully automatic operation!



Fiuld torque converter smooths the way. With Fordomatic's torque converter, power is always transmitted to the rear wheels through a "cushion of oil." There is no direct mechanical connection between engine and rear wheels. So you get smooth operation with a minimum of wear.

Mechanical gears widen operating range. Starts in Da range are through automatic intermediate gear which combines with converter to multiply torque as much as 3.11 times for fast, smooth starts. For unusual conditions, selector may be set at Lo to multiply torque up to 5.13 times!

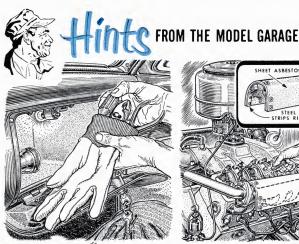


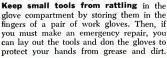
Choose the only V-8 in the low-price field!

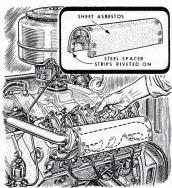
Team Fordomatic with the industry's most modern engine—the new 130-h.p. Ford Y-block V-8 and you have the smoothest, most versatile automatic "power package" in the low-price field. Deep-block, low-friction design spells smoother going, more "Co" per gailon and longer life.

Your Ford Dealer cordially invites you to Test Drive the

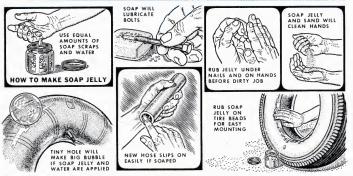
FORDOMATIC Ford







Make an asbestos shield to keep your hands from being burned by a hot manifold when tuning or adjusting an engine. Cut sheet asbestos to fit over the exhaust manifold and rivet steel strips to the ends to clip the shield in place.



Soap for everything. Keep a bar of soap in your car's tool kit-it has many uses: Lubricate a bolt with it when grease or oil would cause a stain; rub it on an inner tube to help locate a leak; slide a hose on a fitting without effort by rubbing soap on the in-

side; or lubricate a tire bead with it to make tire-changing easy. Rub soap over your hands, too, and in your nails before starting a job-washing will be easier later. Soap jelly, made by dissolving small scraps in a jar of water, is especially easy to apply,

Please turn to page 218 for more auto hints. 216 POPULAR SCIENCE



• "Air Force know-how" is the result of top job training at the finest technical schools. Here you can learn anything from Control Tower Operations to Jet Mechanics—from Personnel Management to Printing and Communications. There are over 400 valuable courses available.

- And the job you learn is one you can be happy with—because it's selected scientifically for you by guidance experts who carefully consider your interests, capabilities and the needs of the Air Force.
- Make "Air Force know-how" your way to success, Insure two futures your country's and your own as an Airman!



STUDENTS! If you are still in school, graduate before you enlist!

U.S. AIR FORCE

PERSONNEL PROCUREMEN AFPTR-P-4	TI DIVISION
U.S. AIR FORCE Washington 25, D. C.	
wasnington 25, D. C.	
Please send me more info	rwation on un annar-
tunities as an Airman in	
tunities as an Airman in	
tunities as an Airman in	the U.S. Air Force.

MORE Hints from the Model Garage



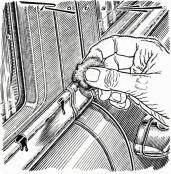
Improvise a coat-hanger bracket by closing a rear window tightly on a rubber fruitjar ring. The ring will support several garments on hangers and will leave no marks or scratches on the window. A ring cut from an inner tube will serve as well.



Calibrate an old coffee pot for use as an oil measure by filling it a pint at a time and punch-marking the side to the level reached as each additional pint is poured into it. Make the punch marks crisp enough to be clearly visible from the inside.



Make fender skirts easy to remove by coating the lock bolts with heavy wheel-bearing grease to keep them from rusting. Skirts are bolted on many late-model cars and it is almost impossible to remove a rusted-tight nut without twisting or otherwise damaging the fender.



Clean paint off chrome trim or rubber moldings with steel wool, after doing a touch-up or spray job on the body. Wind the wool around a stick if the area is small or hard to reach. This way, you won't put scratches on the trim as you might with a knife or scraper.



Ideas for weekend remodeling

with UPSON DO:IT:YOURSELF PANELS



Upson makes a complete line of Panels for remodeling your home. In the recreation room pictured above for instance . . . the ceiling is covered with Upson Ceiling Tiles, washable, durable, attractive. The wall behind the bar is stunning Upson Striated Paneling, easy to apply, easy to paint. The far wall is Upson Strong-Bilt Paneling, permanent, crackproof, adds lasting beauty. The bar . . . sawed squares of Strong-Bilt with beveled edges.

See your lumber dealer and look over every Upson Panel type. Insist on the name "Upson" for top quality material.

For full details, mail coupon today!

upson | DO · IT · YOURSELF | panels

City	Stote	_
Street		
Name		
Please send FREE folder on all L	Jpson Panels.	
	(name of product)	
Please send FREE details on		
488 UPSON POINT, LOCKPORT,	NEW YORK	////
THE UPSON COMPANY,		111
PROVEN QUALITY Y	OU CAN TRUST	

1. Fish scaler takes the mess out of a mess of fish by preventing the scales from flying in all directions. It catches them in a cuplike cover, then rinses clean in hot water. The scraping teeth are cadmium-plated to

make them rustproof and the scale-trapping cup shields the blade for safety when the Scale-Catcher is in use or carried about in the fisherman's pack. The scaler is sturdily made and odor-resistant.

2. Fishing-rod case of toughened plastic will withstand the shock of a 200-pound man jumping on it; won't warp, dent or cor-



rode. Two inches in diameter, the case will hold two fly rods or two or more castingrod tips and most spinning rods. The longest size—55 inches —weighs only 16

3. Casting buoy, threaded on fishing line, locks into position a few seconds after



a few seconds after alighting on the water. An adjustable control valve lets you set the timing on the locking device and the automatic action allows bait to be raised or lowered at will as you fish. Upon retrieve, the casting buoy is automatically unlocked.

4. All-in-one reel eliminates the rod and gives you one piece of gear for spin-casting,



trolling, drop-line fishing and crabbing. A sensitive brake on the rodless reel gives control of fish and line and its fast retrieve—
1½ feet per turn—should land more fish. The reel is lightweight and easy to use.

Rod and Tackle Fans Get New Crop of Aids for Reeling in Big Ones



5. Washable creel loses fish odor when dunked in suds. Big enough to take a 16inch fish without bending, it has plenty of air holes to keep a catch fresh and cool.

Further information on these products can be obtained from: 1. Mercury Plastics Co., 20787 Mound Road, Van Dyke, Mich.; 2. Damont Corp., 23 Bay St., San Rafael, Calif.; 3. Coughlin Specialities Co., 579 Drexel Ave., Detroit 15; 4. Reel-Easy Corp., P.O. Box 1983, North Station, Afflighton F. Azi, 5. Hawkeye Tackle Products, Inc., Dexter, Mich.



HOW TO GIVE YOUR HOME PROJECTS THIS **PROFESSIONAL LOOK!**

...make them yourself with Reynolds Do-It-Yourself* Aluminum using standard hand or power tools

You can turn out project after project easily and quickly with this astonishing new material — Reynolds Do-It-Yourself Aluminum. You can saw it, plane it, drill it, shape it, joint it and bend it with tools found in the average home. In fact, all leading hand and power tool manufacturers approve Reynolds Do-It-Yourself Alu-



African Primitives add Decorator's Touch. Reynalds Da-It-Yourself em-bossed Aluminum simplifies moking. Con be cut with scissors. Easi-Bildt Pattern No. 539. −25¢ with caupon



Designed in easiest-to-use forms, Reynolds Do-It-Yourself Aluminum comes in

sheets, tubing, rods, bars, angles, storm sash, screen sec-tions and handy fasteners.

Caution! Use only Reynolds Do-It-Yourself Aluminum.

Make this Decorator's Library Desk. Na special skill ar experience is needed to build this smartly styled desk. Anyone con build it by following Eosi-Bild Pattern Na. 537. —50¢ with caupan



Porch, Game Room, Terrace Table and Modern Web Chairs. Top is mode fram heavy stack lumber, held tagether with oluminum tubing. Eosi-Bild Pottern No. 554-50¢ with coupon. Web Choirs, Easi-Bild Pottern No. 548. -50€ with coupon



rock at your Hordwore or Deportment Store or Building Supply Deoler's withaut delay. And give your home projects the professional laok with Reynolds Do-It-Yourself Aluminum.

T. M. REYNOLDS METALS COMPANY TT. M. REG. EASI-BILD PATTERN COMPANY

(99)	
REYNOLOS	REYNOLDS ALUMINUM SERVICE CORPORATION
·IT-YOURSELF*	
ALUMINUM	Please send me the following PATTERNS and free backlets

	*FEARITANE	or coin. (No	stomps,	pleose.)	
[☐ Easi-Bild	Pottern #537 far		☐ Easi-Bild Pattern #548 far	
	Decarotar	's Library Desk	50∉	Web Choirs	50e
E	Eosi-Bild	Pottern #539 for		☐ Easi-Bild Pottern #552 for	
	Alricon P	rimitives	25€	Ski-Hi Stilts	25e
٢	Teosi-Bild	Pottern #554 far		☐ How-To Booklet containing	
-	Tarrage T		FA .	annual testenations	FREE

Eosi-Bild Pottern #554 far	☐ How-To Booklet containing
Terroce Toble50€	general instructionsFRE

ddi	055	 *****	 	 	 *********			 	
ity.		 	 	 	 	Zaı	10	 Stote	

maney arder

Poor Man's Space Station

[Continued from page 75]

solar-power supply for charging storage batteries.

As it sped over the poles at its dizzy speed, our new moon would look something like an apple on a stick, with the stick pushed through to poke out at either end. These protruding sticks would be made of cast-aluminum tubes and serve as antennas; they also would contain various instruments such as gamma-ray, cosmic-ray and aurora counters.

A window, made of special filter glass, in the MOUSE's skin would let through only solar ultraviolet rays, another of beryllium would admit only solar X rays.

Data Would Be Recorded on Drum

How would the satellite send back to earth all the information gathered by these counters and instruments? Continuous radio communication would soon drain the solar electric supply. So, to save power, the MOUSE would store up its information and record it on a magnetically coated drum. This hoarded information would be transmitted only twice during each orbit, at the most advantageous points, the poles. There communications planes or ground observers would radar-trigger the MOUSE's transmitter so that it would send out in 30 seconds all the data it had collected in the previous 45 minutes.

This would be done by recording with the drum moving at 1/30 of an inch per second, using 7½ feet in 45 minutes. The playback, at a speeded-up three inches a second, would take only 30 seconds.

Vapor Trail Visible from Earth

Would you be able to see the MOUSE as it sped 200 miles over your head? Not normally. But it could be arranged. Either the MOUSE itself, or the burned-out third rocket that came tumbling after, could exhaust a sodium-vapor trail. This, when hit by bright sunlight at high altitude, would light up with a spectacular brilliance.

After several weeks of its pole-over-

pole globe circling, even the slight friction of the upper atmosphere would slow the MOUSE, letting it go down to make some investigations at lower altitudes before finally plunging earthward to consume itself like a meteor.

Dr. Singer does not recommend a space station as a military bombing platform, pointing out that one cannot just release a bomb from a space station since the bomb itself would become a satellite and not drop to earth. He feels, however, that his MOUSE would have some military value, such as gathering information for long-range weather forecasting and learning more about the vagaries of long-distance radio communication. And he adds another point. Using the upper atmosphere as a vast wind tunnel, the MOUSE could make aerodynamic measurements that would help in designing faster-flying and higher-flying jet and rocket aircraftmeasurements that can't be made in any earth-bound wind tunnel, however big or powerful.

Would Foster U.S. Prestige

In another way, Dr. Singer feels that his modest MOUSE could become a mighty MOUSE: in the prestige it would give us with other peoples, and its psychological effect on any potential aggressor nation. It would boost our technical and scientific achievements sky high. It would shout, "If we can do this on a shoestring, think what we could do with guided missiles on a war budget." END

Tough Guy

Two trucks met on a country road just wide enough for one. Truck driver No. 1, a scrawny, frail little man, leaned out of his cab.

"Turn out, you!" he shouted. "If ya don't, I'll do to you what I did to the last guy who wouldn't turn out for me."

Two-hundred-pound, muscular driver No. 2, not caring to have trouble, pulled out. But as the other truck rumbled by, he yelled, "What'd ya do to that other guy?"

"Turned out for him," said No. 1.-Wireco Life,

222 POPULAR SCIENCE

Xaco



n car care



How to get more miles from your tires

If your tires aren't inflated to the proper pressure, you won't get maximum mileage from them. To enjoy longer troublefree life from your tires, see your Texaco Dealer for regular tire check-ups. He'll inspect the sidewalls for bruises and cuts. He'll check to make sure each tire is inflated to the correct pressure. If your tires show signs of uneven wear, your Texaco Dealer will detect it, make recommendations accordingly.

How to get that "cushiony" ride

Once Marfak lubricant goes on the job, it stays put stretchy (notice the sealing film of Marfak on the tie rod end). Marfak clinas to chassis points of friction and wears, ... resists jar-out and squeeze-out far longer. For you, this all adds up to a smoother applies Marfak by chart — never by chance. Get Marfak lubrication today. See your Texaco Dealer . . . the best friend your car has ever had.

THAT "CUSHIONY" FEELING LASTS LONGER WITH

THE TEXAS COMPANY

Lubrication TEXACO DEALERS

IN ALL 48 STATES

Texaco Products are also distributed in Canada and in Latin America

AUGUST 1954 223

[Continued from page 146]

"Sure, Lora," Gus said. "Matt, what say we adjourn this until we get back? If you'll get the bailing can, Guy, we can wet these embers down. The woods are wet and the fire's on sand, but there's no point in taking any chances." Grabbing two sticks by their unburnt ends, Gus tossed them into the water. In the dark he could now barely make out Bergstrom's face. "If you'll hold the light for me, Matt, I'd like to take a look at that kicker of yours."

Gus climbed into the boat, found the gas tank half full, and noted that the prop was clear of the bottom. He checked the air valve, set the choke and shoved over the spark. Handing the flash to Matt, he yanked the starter handle. The motor sprang instantly to life, idling throatily as he eased off the choke. It sounded fine, Gus thought, wondering if Matt would boil over again. He cut the engine, edged past Bergstrom and stepped ashore.

"Doesn't seem bad now," he said decisively, "but I think you ought to lead the way home, Matt. We'll be along as soon as that fire is wetted down."

Bergstrom was silent for a moment. "Get in the bow, Sally," he said abruptly. "But don't think you've heard the last of this—any of you."

Flickering Farewell

Matt's engine caught again quickly. The boat turned out into the darkness and picked up speed. As it rounded the point of the cove, Sally winked the flash twice in mute farewell.

"I hope they get along all right," said Guy doubtfully. "Or do I?"

Áfter Guy shoved off they could still faintly hear the high-pitched beat of the other outboard in the dark. Then Gus fired up his own motor and they shot out of the sheltered cove. Around the point, waves slapped solidly against the hull and spray blew back over Gus until he eased off on the throttle.

"Look!" Guy saw it first-the yellowing beam of a flashlight out on the lake.

They headed toward it. In a few moments the dim moonlight revealed the Bergstrom boat, broadside to the waves and rolling deeply. Matt was on his knees flailing at the starter; Sally flicked the tiring flash in merry greeting.

"Can't tow — painters aren't long enough," Gus called above his throttleddown motor. "Grab my gunwale, Matt, and hang on! I'll head back to the coveto tough into the wind. Guy, take care of it at the bows. Don't get your hands pinched, either of you." He circled and came up alongside with bare steerageway, then fed more power cautiously once the boats were lashed together by two pairs of arms. They headed back precariously, the strain easing as they turned downwind.

Bergstrom Picks Up the Battle

With both boats beached once more, Matt lost no time in regaining the initiative. "I don't know what you did to that motor," he told Guy, "but you sure bollixed it."

"Gus Wilson, I asked you to take me home," snapped Mrs. Adams. "I don't see why you can't just leave him here—let him stew in his own childish juices. I suppose we could find room for Sally."

Gus felt an amused irritation. "Nobody's going to get marooned, Lora. I think five people are a bit too much of a load to take across in one haul tonight, but if necessary, I can make two trips."

"That mightn't be easy, Mr. Wilson," giggled Sally. "Remember the problem of the farmer who had to row a wolf and a lamb over a stream?"

"Before we do that, I'll take a crack at your father's motor," Gus said. "Worth spending a little time if it saves four trips across the lake. That flash is getting feeble—hold it in close, Guy."

Using the tool kit in the boat, Gus pulled and checked the plugs and examined the wires for raw places. He laid the reconnected plugs on the motor, spun the flywheel. Blue voltage snapped

[Continued on page 228]

Things to do before you go:



BUY A NEW BATHING SUIT





MOW THE LAWN



STOP THE PAPER AND MAIL



STOP THE MILK



There's a lot to be remembered before you go. But don't forget the one thing that can really add most to the pleasure you have getting there: Have your Ford thoroughly checked and "Travelized" now-before you go.

And if replacement parts are called for, remember to insist on Genuine Ford Parts. They're made right to work right to last longer in your Ford.

Every Genuine Ford Part is designed to the same specifications set by the men who originally built your Ford, and thoroughly tested before approval for manufacture. They're your best assurance that your Ford will be fun to drive!

Wherever you go for service insist on Genuine Ford Parts

AUGUST 1954 225

Make painting easier around your home ...



Pointers on painting outdoor furniture, doors, shutters, etc. If old paint is good, wash surface and sand lightly. Do hard-to-reach parts first (chair legs, door edges, etc.). Don't go back over after paint starts to set. Always ...

Use brushes with bristles of Du Pont TYNEX* nylon

You pick up a full load of paint . . . flow it out in a smooth, even coat . . . when your brush has bristles of Du Pont "Tynex" nylon. This means faster, easier, better work on any painting job around your home.

And you'll find that "Tynex" bristles clean easily in any commercial cleaner . . . last up to five times longer than other types of bristles.

Send for free booklet on "How to Choose and Use a Paintbrush Bristled with Du Pont "I'ynex' Nylon." Write: E. I. du Pont de Nemours & Co. (Inc.), Polychemicals Department PS-7, Wilmington, Delaware.

*"Tynex" is Du Pont's new registered trade-mark for its genuine nylon bristles



Take The "PAIN" Out of PAINTING





Take It Anywhere!

Take It Anywherel
No Compressor ...
No Electric Cords Needed,
Sprays: Paints, Oil, Varnishes
Insettleides, etc.
Men! Western ...
Men! Western to 21 oz. containeriul. Used 5 yea successiully in industry. SEE YOUR DEALER! If he cannot supply, order direct for pstpd. shpt. Extra cartridges 10 for \$1. SULLIVAN-BECKER CO. Dept. 124-H Kenosha, Wis.



EARN YOUR OWN KING MIDGET. We vant ider agents to demonstrais and sell the World's Lower to the senser Automobile. Fully assembled or boil together parts. If there is no dealer near you send 25c for detailed literature actual assembly book and sorvice manual. Among words and sorvice manual. MIDGET MOTORS MANDEACTURING CO. ATMENS. OND



NEW POWER TOOL CATALOG

Gives full details on wide line of Millers Falls "Dyno-Mite" electric tools — including the most sensational new "does-everything" power tool ever developed. Also accessories, attachments, supplies. Now at printer. Reserve FREE copy. Writted today: MILLERS FALLS COMPANY, Dept. PS-6 Greenfield, Mass.





	Wood Scrapers
_	Red Devil Tools
	Got your FREE copy of "HOW TO MAINTAIN WOOD FLOORS."
	MAIL COUPON TODAY
	Red Devil Tools, Dept. 127
	130 Coit Street, tryington, N. J.
	NAME
	ADDRESS
	CITYZONESTATE

MAKE \$15,732.00 IN ONE SUMMER \$9,504.00 WITHOUT LEAVING YOUR HOME T REA

Unless you are near a healthy fire extinguisher or a plen-titul supply of WATER. We cannot assume responsibility if this ad breaks out in ROARING FLAMES. So please safety precautions. Yes, we have an item that's H O T —so H O T that we are not going to say other than the usual words of a good product for fear of setting this

good magazine on FIRE. This product is NEW! SENSA-TIONAL! COLOSSAL! AMAZING! and REVOLUTION-ARY.—NO! No long story—All we have to say, and this is modestly, we have an ELECTRICALLY controlled bulb that is the BEST insect killer CONSOLIDATED RE-SEARCII has been able to produce—bar none. Not to be compared with any other unit ever sold.

Testimonials like these are pouring in by the hundreds.

"It works like a charm, I am amazed at its results."—Mrs. Wills, Atlantic City,

"Your magic bulb has at last solved my roach and fly prob-lem."—Mrs. C. I. Thompson, lem."—Mrs. Miami, Fla.

"Has given my family endless hours of comfort living."— Mr. P. V. Zane, Los Angeles.

have heard of the 7 Wonders the World, Now, consolidated of the World. Now, consolidated research introduces the 8th Wonder, acclaimed a MUST in every home and establishment. Being hailed by salesmen as the biggest MONEY MAKER since the opening of the U.S., MINT.

ABSOLUTELY EVERYONE Now that you have taken

the safety precautions, read every word in this ad as we have said above this item is HOT, so hot that to be extra safe we have ordered the pubnave ordered the par-lishers not to use any RED ink. Now, getting serious, fellows, here's the scoop. We are going to do EVERYTHING to make you the most welcomed salesman to ever approach a customer. We ever approach a customer. We will give you GLOSSIES, MATS, IMPRINTS, all the material needed for an immediate mail order set up, also document-ed test reports of how prominent colleges and testing labs, RATE our product, also at your

MATE our secure, also as your disposal is a powerful pulling pitchman sound T.V. movie on Bug Weapon. The production value of this film cost us more than \$2000.00, PLUS BELIEVE IT OR NOT an advertising allowance. We will PRE-SELL this Bug Weapon for you, by launching a tremendous advertising barrage, including almost all national magazines, racio, and T.V. The entire population of the U.S. will be put in check of the population of the U.S. will be put in check of the master will be proposed to the population of the U.S. will be put in the his comfort, interrupt his sleep, destroy his property, and spread contagious diseases about his home, and food. Business estab-lishments suffer enormously combating the using insect problem. They will greet you with arms wide open. It's a tested natural with STAGGERING public acceptance and with STAGGERING public acceptance and mountainous profits. Yes, you will be WELCOMED, you will be THANKED, most important you will make MODMEY.
VOLUME SALES CORP., Research Dept. PS-8

2000 Market Street Philadel, hia 3, Pa,



Nat a gadget — not a halfway measure. Not to be compared with filmsy, untried imitations: A finished quality appliance. Carries on iranclad 10-year guarantee and parts replacement policy. Bound by signature.

that the and reaches as supered the street of the street o

ODORLESS . SILENT

MYSTERIOUS

FREE	DEMONSTRATOR	COUPON
------	--------------	--------

	Enclosed is \$2,98. Send me one unit for my personal use.
	Enclosed is \$2,98 in cash, check or M.O. Rush me one 20th CENTURY BUG WEAPON
_	with sales side and I OWED wholesale prices. However, should I become an active sales-
	man you of the Volume Sales Outlet are to REFUND my \$2.98 making my demonstrator
	FREE. Furthermore, I must agree that everything you say be true or t will return every-

Send one MONEY MAKING sales kit C.O.D. Lost time is lost money. Rush me dozen BUG WEAPONS, at your wholesale price-Don't lorget to include my FREE demonstrator and sales aids, C.O.D.

☐ Together with the enclosed order don't lorget to show me how to make \$4.37 on each \$2.98, \$15,732.00 in one summer, \$9.504.00 without leaving my home.

NAME	
ADDRESS	
CITY	

VOLUME SALES CORP., Research Dept. PS-8 2000 Market Street Philadelphia 3, Pa.

ABSOLUTELY EVERYONE MAIL THIS COUPON NOW!

DO-IT-YOURSELF PROJECT WITH TRIPLE PAY-OFF



In making his own house sign (for example), this man is (1) saving money, (2) adding to the value of his home, and (3) having a lot of fun doing it.

What's more, his pride of achievement is heightened by his possession and use of good files. They're NICHOLSON. This and BLACK DIAMOND are the most famous two brands in the world.

He knows their teeth are sharp, evenly high, of uniform hardness, and have extralong life. They're the choice of both the professional and the exacting amateur craftsman. They've the quality good hardware and tool-supply dealers like to recommend.

FREE—"File Filosophy," Nicholson's famous 48-page illustrated book on kinds, use and care of files. Shows and describes many types of files for use on all sorts of projects com-

prising hard or soft metals, wood, plastics, etc. Send for It.

NICHOLSON FILE COMPANY

19 Acorn Street, Providence 1, R. 1. (In Canada: Nicholson File Company of Canada Ltd., Port Hope, Ontario





NICHOLSON FILES FOR EVERY PURPOSE

Gus Rides Out a Storm [Continued from page 224]

across the points. He turned to the carburetor, squinting in the dim light,

"Sure wish we hadn't doused that fire,"

he said. "This is mean to see."

"I can get another one going right there on the beach," Guy volunteered. "Anyone got any matches?"

Gus felt his pockets, shook his head.

"I don't smoke," rasped Matt.

Clever Fireman

"It doesn't matter-show them what you did before," Sally called from the shore. "Toss me that old flash and I'll get some branches from the dead pine."

The two youngsters pitched in, glad of the chance to show off before their elders. In a moment Sally dumped an armload of pine boughs just above the water's edge, handed the almost worthless light back to Guy, and went back for more. Guy uncoupled the fuel line, drew a cupful of gas into the bailing can and handed it over to Sally, who poured it on the wood. Guy tore a narrow strip from his handkerchief and wet it lightly with gas. He folded it into a pad, checked that the tank was capped and the fuel valve was off.

"All set?"

"You bet."

Using pliers to hold the pad by the end of one plug, Guy hauled on the starter handle. Nothing happened. The second time he tried, snapping sparks ignited the cotton. Carefully holding the flaming little torch with the pliers, Guy stepped ashore and tossed it on the fuel-soaked pine. At once the fire flared.

Treasure Trove-Two Hot Dogs

"Hey, that's pretty slick," Matt said. The warm, dancing light seemed to cheer everyone up. Lora Adams, investigating the picnic hamper, held up two hot dogs she'd found.

"With a frying pan, we could cook up

a little snack," said Mrs. Adams.

"I'll get you a couple of green sticks," Matt told her suddenly, "Wait a second."

[Continued on page 230]



In many communities we need active mechanically-inclined men as dealers to sell and service ROTO-HOS and attachments. It's pleasant, outdoor work and you will find it's easy too. These popularly priced power garden tools have won the hearts of tens of thousands of American home owners and gardeners—in fact. ROTO-HOS is now the largest selling tool of its kind in the world! II you are not a traid to seek out to make calls; and demonstrate ROYO-HOE, and do the small amount of terrising reluterists on should be able to develop your own highly profitable spare time for full time business—on a minimum investment. We furnish you names of prospects in your neighborhood also circulars, catalogs, and other sales material.

Write today for full information—it may be the opportunity you wanted for years!

ROTO-HOE & SPRAYER CO., Box 18, Newbury, Ohio



AMAZING, PERMANENT MAGNETS-WILL NOT WEAKENI NON-ELECTRIC unaline, FERMANEN MAGNELS—WILL NOT WEAKEN NOD-ELECTRIC VARIANCE, FERMANEN MAGNELS—WILL NOT WEAKEN NOD-ELECTRIC VARIANCE AND A CONTROL OF THE WASHINGTON OF T



ills long felt need for small mixer for concrete, rtilizer, seed and many other materials. Sav set of ready mixed concrete. Pays for itself on fire ombination belt pulley and crank for hand oper lso power mixers. Write for circular. Pays for itself on first crank for hand opera 5 Cu. Ft. Drum-Mixes 3 Cu. Ft. Concrete





PERMANENTLY mends cracks PERMANENTLY mends cracks or holes in wood, tile, stone or plaster. Sticks and stays put—Does not chip, shrink or fall out. Easy to use. Economical. Mold it, chisel it, polish or paint it. If unobtainable from your lumber, pain or hardware dealer, the big 4-lb. can will be sent you post-paid (in U.S.) for only \$1.25. Full money-back guarantee,

order now. DONALD DURHAM CO. Box 804-U. Des Moines, Iowa

Make sure of your



Your Cars Best Protection Against Fuel Pump Failure

Here's o fuel pump that'll never let you downthe most dependable ever developed. Its extra capacity and durability combine to assure years of steady, smooth-pumping oction under the roughest, toughest driving conditions.

See your neorby Carter deoler. He's listed under CARECTER in the yellow pages of your phone book.





WHAT'S YOUR "SHAVING?" Want your short cut or shop trick printed? Send it to United States Plywood Corp.,
Box, N.Y. 36, N.Y. If used, we'll send you a one year subscription to this magazine. All entries become our property. None can be returned.

NOTHING CRUMBY ABOUT THIS. Take the wife's breadboard and cut a shallow rabbet all the way around. Now glue and screw a frame to the edge of the board, flush with the cutting surface. Crumbs from cutting just fall into the rabbet.

LIKE A HAPPY MARRIAGE. If you want wood joints to last, use Weldwood Plastic Resin Glue. It makes a bond stronger than the wood itself. And it gets stronger as it ages. Always in perfect condition when you want to use it, because you mix it yourself from the powder, in a few seconds. Stainfree, rot-proof, highly water resistant, inexpensive. America's largest selling wood glue.



HELP BY THE BOOKFUL. Ask The Government Printing Office, Washington 25, D.C., to send you FREE, "Hobby Publications"—a list of booklets from which you can select many useful volumes.

"LOOKS LIKE A MILLION." Here's a sure easy way to get that costly hand-rubbed "natural" finish on wood get that costly hand-rubbed natural minsh on wood tables, book shelves, cabinets, etc. Use easy-to-apply Satinlac. Works on any wood, hard, soft, solid, or ply. Satinlac doesn't look "built-up"; doesn't darken the wood or turn yellow. Gives "pro" results and protects the wood.

NO HITS - NO ERRORS. Here's how you can banish accidental hammer dents in wood surfaces. Cut a hole through a piece of heavy cardboard. Slip it down over the nail — it will take the dent if your hammer misses.

A PRETTY PICKLE YOU'LL LIKE. Those luxurious pickled or blond wood finishes you see in the fashionable furniture stores are easily yours. Use White Firzite for blonding or pickling. For pastel tones, tint White Firzite with colors-in-oil, You'll get exciting professional results on any wood!

TRICK OF THE PAINTER'S TRADE. On soft wood or fir plywood stain jobs, you can tame that "wild" grain with a coat of Clear Firzite. Gives that smooth expensive-wood finish. *TRADEMARK



Plastic Resin Glue

Makes a bond

stronger than wood itself. High-

ly water resistant.







At bardware, paint, lumber dealers.

United States Plywood Corporation Dept. 136, 55 West 44 St., New York 36, N. Y. Send me free leaflets on Weldwood Plastic Resin Glue, Firzite and Satinlac.

NAME

ADDRESS.....

Gus Rides Out a Storm [Continued from page 228]

He trotted up to the edge of the woods. Gus smiled as he worked over the

carburetor. The float needle moved freely and there was no grit or sediment inside. He uncoupled both ends of the gas line and drew out a two-inch bronze filter element. The line was clear, Taking up the metal filter element, he shook it, blew through it until his cheeks bulged, and stared at it for a moment.

Then he did a strange thing, Laving the filter element on the seat, he drove the point of his knife right through it. He blew through it again, and then carefully reassembled the parts.

"Now," he said with conviction, "we can go home."

"Darndest thing I ever saw, Gus," said Matt, "the way you drove a knife right through that thing like butter."

Motor Starved by Clogged Filter

"It's not hard. The filter is a kind of spongy bronze-it works fine, stops dirt or water dead in its tracks. Like any filter, it clogs up if it has too much work to do. When it's almost saturated with water it will starve a motor, but let enough gas through for idling. Let the motor sit a while, and enough gas will dribble through into the carburetor to run at full throttle for a few minutes.

"In the shop you can blow out the trapped water with compressed air, but I put a slit through just in case, May be a little water-spitting from the motor, but I doubt it."

"If you great brains have that problem licked," said Mrs, Adams with amiable tartness, "maybe you'll tell me how to divide up two roasted hot dogs among five people.

"Three people," corrected Guy, who was sitting by the fire with his girl. "Sal and I can't eat and harmonize at the same time." They sang a chorus of "Show Me the Way to Go Home" and it seemed to Gus, whose ear was better tuned to knocking than to flatting, that it was darned nice music.

NEXT MONTH: Gus closes a sticky case.

HYDRAULIC PUMP Powerful - Reliable ITEM #160-Es-



pecially designed for belt drive from fan belt, power rakedrive pulley, ic motor or electric motor or smail gas engine. Equally suitable for

Equally suitable for direct coupling. Educated type mounting with two holt holes for "s," hold-down holts. Stand-ports. Delivers. 4.5 (F2) at 100 PS1 at 2800 RFW with 3 H1.9 Will actuate one tiem #223, 334," host. All the standard of the standard policy and the standard

SELF-PRIMING HAND FLUID PUMP



ORDER DIRECT FROM AD SATISFACTION GUARANTEED

Send Payment Or Purchase Order Today FREE FALL EDITION

BRONZE & MONEL BALL BEARING



1/4 10 5 H.P.

PSE BUTTON

SHAFT N. LOCK

| Hearing | Hear

600 R.P.M.-

ITEM #371V

Brand New-Pesco HYDRAULIC CONTROL VALVE

FOR SAFE POSITIVE CONTROL OF HYDRAULIC CYLINDERS AND MO-TORS — BUILT-IN RELIEF VALVE — factory set at 1200 P.S.I. • FOUR WAY VALVE—to operate one double acting cylinder • OPEN CENTER unloaded. •
BALANCED
valve combi acting cylinder • OPEN CENTER—we cylinder is locked in position and is SPRING RETURN TO NEUTRAL STRUCK RETURN TO NEUTRAL CYLINDER CYLINDE

16.50 GROBAN HYDRAUMGSPEED REDUCER

with FINGERTIP CONTROL FILLER PLUG

with FINGERIJP CONTROL USE FOR, 8 easers Drives • USE FOR, 8 easers Drives • Continue Machines • Conveyor Conning Machines • Conveyor Control Machines • Conveyor Control • Cont

SUPPLY CO. Pept. PS-8

AMP. D. C. GENERATOR

Amps. -Volts.

Type R-1, ITEM #91

ernment Acquisition Cost \$380.00. Shpg. wt. 55 lbs. Discost \$380.00. Shpg. wt. 55 lbs. Discost 16° x 10° x 7°. Complete with Instructions to connect as Welder. 35.00 F.O.B. Chicago.

35.00

HYDRAULIC CYLINDER

ITEM #31C-3½" bore, 11" stroke. Alloy steel cylinder wall. Micro-Honed and all sleel 1½" diameter piston rod. 19½" overall length plston rod. 1912" overall length closed. Clevis mounting at base and shaft, Will lift 9625 lbs. with 1000 PSI Pump Pressure, Uses 38" tubing fittings. (Fittings to pipe thread: two 38" MPT @ 35c.) A \$102.00



BLACKHAWK HAND-HYDRAULIC PUMP

HAND-HYDRAULIC PUMP ITEM 282, Perfect for Show Plows, Farm Show Plows, Farm Property Plows, Farm Property Plows, Farm For Plow

TO PLACE PHONE ORDERS CALL WEbster 9-3793

SHEET METAL BRAKE



VYKE MFG. CO., 5-2439 15 St., Denver 2, Colo.



AVE., CHICAGO 5, ILL.

LIMITED SUPPLY! BRAND NEW, BALL-BEARING
11/2-HP, 2-HP, 3-HP ELECTRIC MOTORS
FAMOUS BRAND! SAVE WAY OVER HALF!

Powerful Capacitator motors with neary starting forque to handle EVERY heavy-duty job. New, bail-bearing models that mount IN ANY POSITION. 3456 RPM, 115-230 volts, 60 cy., single phase. Perfect for saws, wood-working tools, blowers, grain elevators, pumps, and farm equipment, Fully Guaranteed. Save doilars.

ORDER OHRECT FROM THIS AD TODAY!

ORDER DIRECT FROM THIS AD TODAY!

11/2-HP, Regularly \$110.00. Special sale........\$47.50 fob

2-HP, Regularly \$130.00. Special sale........\$57.50 fob

3-HP, Regularly \$160.00. Special sale.........\$75.00 fob

FREE CATALOG

ROBERTS ELECTRIC Co., Dept. \$-208, 849 W. Grand, Chicage 72, III-Transformer Type Arc Welder Husky Boy d driven

tdoor welding

caupon and mail

Cash in on the big demand for depend--full ar part time-with a Hobart and able are weldors. Set up your awn shop start earning hundreds of extra dollars.

HOBART BROTHERS COMPANY, BOX P-84, TROY, OHIO, U.S.A. Phone 21223 FREE booklet.

Check and mail with name and address todayl

Husky Boy AC Trans Type Hobart Trade School, Gl approved.

See it! Living plant and animal life in and around your home. Free Micro-Manual tells you how to use, where to look.

To-Manusi tells you how to use, where to look.

OVER 3.000 in use in schools, universities, by hobbyists. 15X eyeplece shoulded in purchase price. 4X, 8X, 10X, 12X eyepleces available. See existing the school of the school of

FREE Micro-manual & 44 pg. Catalog shipped with order or mailed free on request. Microscopes from \$9.95 up — tele-scopes, binoculars, slide-making supplies. 150 - 300 - 600 POWER MODEL 435

極AKRON 107 AKRON BLDG. \$2995 POSTPAID 4379 SUNSET BLVD., LOS ANGELES 27, CALIFORNIA



AUGUST 1954 231



GEE! THIS IS FUN!

Trim Grass

20 Times Faster Than by Hand

- No Stooping
- No Stiff Back

Porter-Cable

Grass Trimmer

At last, faster, neater trimming in hard-taget-at places . . . clase to walls and fences . . . around trees, hedges, flawer beds . . . alang walks, driveways and rock gardens. Ideal far mowing steep terraces and slapes.

Use it as a scythe to cut tall, coarse grasses and weeds.

Safe, Powerful, Rugged

Rustless aluminum construction. Weighs only 4% lbs. 7'' hardened steel blade. Die-cost mater hausing keeps out maisture, dirt and grass. Fully insulated handle encloses wiring, prevents tangling in shrubs and plants.

Jam-Proof Clutch

Blade Stops Automatically upon striking racks, hummocks ar other obstructions. Prevents motor and switch burnouts. Clear-Vision Guard gives view of blade path when trimming close to plants.

Toggle - Switch in Handle always within convenient reach.

Strain Reliever prevents damaging strains an card.

A Practical Reliable Tool for long, heavy-duty service. PORTER-CABLE MACHINE CO.

	ONLY	1
/SA	A	50
\'Z	14	ï
Z		1

Please send me camplete details and name of nearest dealer for your "Yardmaster" Grass Trimmer No. 134.
Name
Street
CityState
In Canada write Strongridge, Ltd.,

The Truth About Your Brakes [Continued from page 104]

Suppose a car is put to a standard fade test. Accelerate it to 75 and brake it down to zero at a standardized high deceleration-just shy of sliding rubber. Repeat the cycle immediately, for up to a hundred times. As the brakes grow hotter, the required pedal pressure climbs up. If the car is a bad fader, you'll reach a point where you can't get the standardized high deceleration no matter how hard you push. More likely you'll reach a kind of stability. Needful pedal pressure may climb up 30 or 35 percent, then level off and hold.

What happens, of course, is that the brakes have become as heat-soaked as they will get. It follows that everything designers can do to lower this stabilized temperature helps control fade. Most past work has been on metallurgy and heat transfer inside the brakes. In the future there'll probably be more attention to air flow outside, including ducting, fanlike disk wheels, and more fins,

Decelostats yet. On a crash stop with all four wheels sliding, you have almost no directional control. A rolling wheel wants to go where it's pointed; a sliding one doesn't give a hoot where it goes. One possible answer to high-deceleration swerves is the "decelostat" or brake governor. This is a rotation-sensitive dingus that instantly and slightly eases braking on a sliding wheel.

Similar devices work well on trains, to prevent "flat" wheels, and on aircraft, where a blowout caused by a locked wheel on the landing run-out can be bad Preliminary proving-ground work suggests that governors may help a bit on fast-stop swerves. Detroit people are close-mouthed here.

Riding in Style

The teacher had been giving the class a description of different kinds of railroad cars and she paused to ask if anyone knew what cars that carried cattle were called. A moment of silence, and Johnny called out, "I know, they are Cattleacs."-L & N Magazine.



NEW SANDER L-I-G-H-T-S WORK AS IT SANDS!

Only SYNCRO '900' SANDER Only SYNCRO '900' SANDER gives you all this built-in work light—most powerful reciprocating anteed against born-out during owner-ship-removes more material with less upkeen-no twisty tornuc to fight-heavy pukeen-not visity tornuc to fight-heavy syncro Catalog and new FREE' 'Surface Preparation' SANDING HANDBOOK!



FREE '900' CATALOG

BEND Light Ten Highly accurate and

versatile for better than average work. 10" swing. Send for free catalog.

SOUTH BEND LATHE South Bend 22, Ind.





PUNCH PRESS

1 Ton Power Bench Type Make Your Shop Complete

Powerful • Dependable • Economical Easily make your own dies for light stampings, forming, riveting, etc. Ideal for production or experimental work, Replaces more expensive presses. Uses V4 to V2 H.P. motor, which is the production of the produc ALVA F. ALLEN, Dept PS, Clinton, Misseuri



C_571NG \$50 & UP!

*s work of Jig, Keyhole. Cop.

Band. Rip, Hacksaw. Has

t.in air blower, fits any ¼*

1, cuts wood, pastics, metals,

out dealer or try it on our 10
trial. Send check. M.O. (Post
). C.O.D.'s—postage extra. ARROW METAL PRODUCTS CO.



he OUICK-WAY to SH



The preferred Sharpener—featur in leading publications (FOITUNE Anyone can use on own power in big...guarantees precision grin ing and spacing of teeth; sharpe circular saws up to 12" dia. ing and spacing of teeth; sharpens circular saws up to 12" dia. New Extra Feature—Adjustoble Safety-Rest prevents tilting or gouring Complete with patented Index Plate. mitre block, and \$3,00 Grinding Wheel—nothing extra to buy—saves time and money order. Send or money orders, Company of the Safety San Company of the Safety Safety Company of the Safety Safety Company of the Safety Saf

Model 6-12P QUICK-WAY Saw Company
100 Hernby Drive Painted Pest, N.Y. \$16.50 Postpaid

New Easy Way to DRY CLEAN RUGS ..Earn Big Money! Only AMERICAN

New wonder-way to dry clean rugs can start you earning big money every day! Full or part time. Homes, stores, offices are prospects! Amazing American ALM-13 machine with exclusive new Float-Action Whirling Brush does the work-so easy a child can operate it! Just spread drycleaning material on rug . . . then guide machine while brush whirls this material thoroughly into fibers of rug. Out comes grease, grime and deep-down dirt! Pick up with vacuum. Rug can be used immediately. Clean rugs on location. No hand scrubbing. Does professional job in a jiffy . . . makes rugs new-looking! Minimum investment. Write today for details! Make extra profits—use same machine to clean floors, too! Easy-to-use ALM-13 does five floor jobs with no-tool attachments ... scrubbing, steel wooling, buffing, polishing, waxing . . . wood, rubber, asphalt, linoleum . . . make money on all floors!



BIG PAY SANDING FLOORS

Get ahead in fast-growing building field! Be a floor surfacing contractor and sand both new, and old floors. No experience needed. High earnings, steady work with a future! Write for booklet "Opportunities in Floor Surfacing," enclosing 25 cents in coin or stamps to cover handling.

FLOOR MACHINES

٠.		
•	NDI	
-		٦
1	_	٠

The	American	Floor	Surfacing	Machine Co.	
532	So. St. Cla	ir St	Toledo 3.	Ohio	

Send full details on new easy way to Dry Clean Rugs and make money!

☐ Here is 25c in stamps or coin for booklet "Opportunities in Floor Surfacing", telling me how I can start my own floor sanding business.

Name	
Street	

Do it with DREMEL Straight-Line Action Sanders

Get perfect finishes...no gouges ... no scratches...no swirls!

For the finest finish sanding, take a tip from the professional craftsmen-insist on Dremel Straight-Line Action Sanders. They save you money when you buy them. They save time, labor, and expense when you use them. And they're guaranteed to produce finer finishes because straight-line action sands with-thegrain-prevents cross-grain scratches and orbital swirls. Hobbyist, jack-of-all-work, or pro-fessional-there's a Dremel Sander for your needs.

Of the four common sunding actions, only Dremel sands 100% with-the-grain — the only guaranteed scratch-free action approved by finishing experts.











NEW MODEL "53" SANDER WITH POWERFUL BALL-BEARING ROTARY MOTOR

This new sander is a reat powerhouse. It is a handyman's price, the first ROTARY MOTOR LAC sander Straight line action. Weight only 3½ lbs., which was a substantial with the sander makes selling to the sander makes selling to the sander makes selling to the sander with the sander with



EXCLUSIVE! Model has a quick-action detachable sanding pad. Extra pad furnished free.





Model "2000" Sander - Polisher Price includes: Sturdy. steel carrying case, Model '2000' Sander-Polisher. I polish pad, 25 asst'd abrasives.... \$24.50

Model ' A"

Sander-Polisher-Massager

Three tools in one! Lighter capacity for general-purpose use. Features "Straight-Line Action"; high speed reciprocating motor; Wt. 2½ bs.; 12 sq. in sanding surface. Complete with 1 polish pad, 1 massage pad. \$12.85





SEE YOUR DEALER: If he cannot supply, order direct on 5-day trial, morey-back guarantee. Remit in full for postpd. shipment: or send \$2, pay postman balance plus postage and COD.

DREML MFG. CO., Dept. 124-H, Racine, Wis.

234 POPULAR SCIENCE

Building a Tesla [Continued from page

all be of small capacitors, but they the same voltage rating. Co ie altering C1 until the healthiest core obtained.

The plate of the tube may glow dull red. This is normal and no cause for alarm. But if prolonged operation brings the plate up to an orange or yellow glow, the plate switch should immediately be turned off and the tube allowed to cool, with the filament left on. If the tube tends to overheat constantly, change the grid resistor to one of 5,000 ohms.

Keep off the air waves. Since the Tesla



THE FRONT PANEL, shown above, carries the two toggle switches and a grommet through which the line cord and the ground wire pass. Tape the ground safety wire to the line cord every few inches and attach an alligator clip to the end of it. When plugging in the outfit, fasten the clip to the screw holding the cover plate of your household power outlet, backing the screw out a bit if necessary. This grounds all of the exposed parts for safety.

coil shown is sharply tuned to a frequency off the broadcast band, it should cause less interference on radio and television than an arc welder, electric shaver or other sparking device.

However, harmonics or stray frequencies may cause a buzz at certain points on the dial of a radio placed only a few feet away. Moving the radio or the coil a short distance may clear this up.

Connect only small objects to the highvoltage terminals. Avoid large plates or long wires, as these radiate excessively, and may cause radio interference, besides stealing power from the corona effects. Be sure you always ground the power clip before switching on the unit.

QUALITY TOOLS at a Savings up to 60% ONLY 75¢ EACH FOR PINOPPRYED PRECISION



- CONTRACTOR

ILLUSTRATED CATALOG

HUNDREDS OF TOOL & TOOL KITS 25 & REFUNDED OF FIRST ORDER

FLAT NOSE High lunvaments of ouristance...
accuracy. Set includes Plan...
Ringhead Bow Dividers, Compasses for use with int or pencil.

Pans and all necessary parts...
Luther Light 29 Pc. TURNED-DOWN SHANK SPEED DRILL SET LOUND NOSE 45 etterre en 6-7 to Set - \$3 29 postpaid

CR 95 13 Pc. HIGH SPEED DRILL SET



13 Pc. HIGH SPEED DRILL SET Made of finest hardened tool steel. Especially designed for High Speed electric drilling through the hardest metal, steel and wood. Full jobbers lengths and are peaked in a sturdy metal index. Sites by 64th, from 1/16" to 1/4", and to sell for 3.78 our price only \$2,98.



4 Pc. POWER AUGER BIT SET Made of finast tool steel specially tempered and herdened to give years of quick, cheen, easy drilling. Shanks will fit all electric drills. Packed in sturdy, heat treated, compartmented plastic tool roll. Sixes: ½", ½", ½", ½", ½", ¾", and I".

DRILL STAND

Rustproof, cadmium plated, will hold 21 Jobber or Letter Drilh. Stands upright on shelf or bench. Drill sizes plainly marked on each opening. Sized by 64ths from 1/16"

.......

11 Pc. DRAFTING SET tigh lustre chrome plated instru-nents of outstanding quality an accuracy. Set includes Plain en

6 Pc. METAL CUTTING FILE SET



27

SNIP H.S

ade from the best quality tool steel, signed for the requirements of ma-anics, instrument wetch and jevelry of the steel on the following 51/2 long neadle files th round shanks and high test cutting alities: round, half-round, flat, oval, qualities: round, namedame, knife, square. 9BE complete set postpaid

4 Pc. DROP-FORGED TANG CHISEL SET Swadish pattern, of high quality tempered and hardened tool steel. Blades bevaled and polished. Hardwood, leather tipped handles. Set contains one each 1/4", 1/2", 1/4" and 1" chisel in plastic com-

POLISHED STEEL VERNIER CALIPERS



Imported praction instrument of 5" measuring capacity with inside and outside jaws, depth gauge and friction roller adjustment. Graduations 1/16" and 1/32", vernier reedings 128". \$1.39 postpaid

12" WORK BENCH LEVEL

Made of herdwood beech, kiln dried and lecquered. Equipped with horizontal and plumb vial. Horizontal vial covered with a steel plate NPL. Rep or 59c PP-

elers, Optical Workers, Hobbyish, an of all kinds. These superb Ger-truments are of drop-forged, heat-kinh quality tool steel, fabricated,

3 Pc. PLIER SET

6 FOOT WOOD FOLDING e of well sessoned lumber metal tipped ands and spring s. Markings are sharp and graduated in 18ths. 8 foot

(managed)

75c each

Finest drop forged imported steel. Ground and polished heads, pol-ished finish, and knurled handles for assier grip. Individually pock-eted in heat seeled plastic kir. I—Linexman Skip Joint, 7" I—Long Note, 5½"

eta set postpaid \$2.98

49c postpaid

ALUMINUM LINE &

POCKET LEVEL g. ¾"x3", hexagonal shap ging on line. Equipped wi

49e pp.

MANAUM ODDER, SIND CHECK OR

MONEY ONDER, IF COD. YOU FAY

POSTAGE AND CO-CHARGES, WONEY

POSTAGE NO CO-CHARGES, WONEY

SOLINANTER HOT COMMETENT SATISFED.

611 BROADWAY, DEPT. MS-9, NEW YORK 12, N. Y.

STOP MOISTURE DAMAGE FOR GOOD!

Just plug in A the amazing FRIGIDAIRE Electric DEHUMIDIFIER



Only 181/4" high - 201/2" long - 113/4" wide

Positively controls moisture in basements, linen closets, playrooms, workshops-or any closed area up to 10,000 cu. ft., where moisture is a problem.

Plug into any convenient outlet. Fan draws moist air through refrigerated coil, Moisture is condensed and collected in container. Dry, filtered air flows into room.

See your Frigidaire Dealer for further details. Or write for free folder to Frigidaire, Dept. 2251, Dayton 1, Ohio. In Canada, Toronto 13, Ontario.



Built and backed by General Motors

lt's easy to"weave" a carport

with

MASONITE PRESDWOOD

It's different! Attractive! And easy to make! Use tough, grainless Masonite Tempered Presdwood®. Resists heat and cold, wind and water. Lasts indefinitely. Plan can also be used for a woven fence. See your building materials dealer. Send for "Idea Book" and carport plan No. AE-296.

PRESDWOOD WOOD MADE BETTER

MASONITE 2-CORPORATION

Dept. PS-8, Box 777, Chicago 90, III.

Please send me plon No. AE-296 for carport and your

				=		-		 	۰	1	-	_	•	_		 	_		•	í	_	 -	•	_	•	-	•	_
Nome.			٠.																									
Addre	55,	٠.																										

County......State..... "Masonife" signifies that Masonife Corporation is the source of the product



Now-an easy way to wash your car!

JUST SPONGE IT ON -RINSE IT OFF!

FAST-ACTING, ECONOMICAL DU PONT CAR WASH

NEW DU PONT CAR WASH cleans faster and easier than you ever thought possible. Just sponge it on . . . rinse it off . . . and your car dries itself. No wiping or chamois work! Du Pont Car Wash gets off all the grease and grime . . . leaves your car spotless,



One tablespoonful washes your car. Half-pound can gives 20 washes!

DU PONT Nº 7, **PRODUCTS**From Chemical Research . . . For Easier Car Care



BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

236 POPULAR SCIENCE

America's Best Young Driver [Continued from page 83]

As an added hazard, national Road-e-o cars—in both the skill test and the road check—carry little black boxes known as jerk recorders. Sudden starts and stops set pendulums to swinging and a counting device to clicking. Road-e-o judges know that in order to drive smoothly, you have to anticipate turns, stops and lane changes.

The Road-e-o's written quizzes become progressively harder, but even at the local level they demand more information than many an adult driver has bothered to acquire. Last year's national champ got 59 out of the 60 questions.

Each national finalist also gets a workout on an auto-training device. Sitting at the controls of an ordinary car, he guides a tiny model auto on a moving belt painted to look like a highway. As the road rushes by, it confronts him with a variety of problems. At the same time, a little sign box flashes instructions, and a miniature traffic light keeps changing. The driver's mistakes and reaction times are automatically recorded.

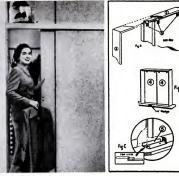
His Driving Took Him to College

Martin Desilets, the first national champion, entered the Road-e-o because he needed the prize money to study engineering. His first-place money got him to the University of Virginia for a year and a half; then he decided to quit school temporarily and get his military service over with. Now he's in the Air Force.

The runner-up that year, Milton Vaverek of Pontiac, Mich., had quite another problem, a foot crippled in infancy by polio. He flew home from the national Road-e-o on a Sunday morning and entered a hospital that afternoon for an operation. His money went for the bills.

Last year's winner, Jim Miholick, interested both in automotive engineering and music, planned to enter the University of Hawaii. Martin Burley of Fargo, N.D., runner-up, is studying architecture at North Dakota State. Frederick Betz of Baltimore, third-place winner, entered

[Continued on page 238]



- · Easy to install and maintain Save up ta 35% in floor space
 - Cost less than ordinary doors · Slide silently without binding Guaranteed against warping in excess of 1/6" when properly installed and finished.

Novoply Sliding Door Units by Neldwood



UNITED STATES PLYWOOD CORPORATION Warld's Largest Plywood Organization

Weldwood Building, 55 W. 44th St., New York 36, N. Y. U. S.-Mengel Plywoods, Inc. . Louisville, Kentucky

ADD A CLOSET IN A HURRY

with a NOVOPLY Sliding Door Unit

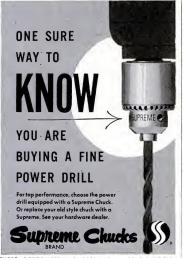
Family cramped for closet space? Make a closet and face it off with a Novoply Sliding Door Unit. It includes everything you'll need in one complete package jambs, header with track, roller track hangers, doors with pulls and floor guides.

HERE'S ALL YOU DO:

- 1. Assemble header (1) and jambs (2) and place in rough opening. Shim jambs to make
- 2. Place adjustable overhead roller carriers (3) in grooves of overhead track in header (1). 3. Adjust doors with wedge (Fig. B) and secure with screw in carrier.
- 4. Install door guide clip (5) in floor (Fig. C).

You can have units ranging in height from 6' 91/2" to 8'; in width from 2' to 8'. Several together make a modern storage wall. Doors can be stained or left natural. Units available with or without upper storage area; in Novoply or genuine birch.

See your lumber dealer or send today for free folder.



SUPREME PRODUCTS, INC., 2222 S. CALUMET, CHICAGO 16



Favorite of home owners and craftsmen for 20 years! SPEEDY SPRAYER gives your work that professional paint finish your work that professional paint fanish everyone admires. Sprays paint, enamel, varnish, lacquer, etc. . . . 4 to 7 times faster than hand brushing! Lightweight, portable, uses any ½ H.P. motor. Improved diaphragm principle assures clean, oil free air. You'll find dozens of time and money saving uses for SPEEDY SPRAYER, including, spraying insecticities 2-4-D and DDT. Comiculum, spraying insecticities 2-4-D and DDT. Com

plete outfit, without motor, only \$36.50 At leading bardware, lumber, and auto supply dealers. FREE—write for handy booklet "How to Spray."

W. R. BROWN CORPORATION 2637 N. Normandy Ave. • Chicago 35, 11



This oil-pumper needs Tough-but-oh-so-gentle piston rings*

Oil-pumping is just the start of expense and trouble the first danger signal from worn-out piston rings. The longer you let those old rings stay in, the more oil you'll use, the more power you'll lose, and the bigger your repair bill will bet

As your engine gets older, it runs hotter because of accumulations in the cooling system. The cylinders wear tapered and out-of-round—need more oil on the walls.

It requires a special type of piston rings—replacement rings—to deliver this extra oil, under full control, with-

out waste.

Hastings pioneered in the development of steel oilcontrol rings and revolutionized the entire piston ring industry. Hastings makes replacement rings exclusively, devotes all its research, on the highways and in the laboratory, to the particular replacement problems of each make and type of engine.

That's why Hastings Rings stop oil-pumping, check cylinder wear, restore engine performance—in re-ring,

re-bore and re-sleeve installations.

So go to your motor specialist at the first sign of oilpumping or performance drop-off. If rings are the trouble, ask him to install a Hastings Steel-Vent replacement set. Truly the best money you can spend on your car!

HASTINGS MANUFACTURING COMPANY - HASTINGS, MICHIGAN HASTINGS, LTD., TORONTO

Piston Rings, Casite, Caslube, Drout, Oil Filters, Spark Plugs



America's Best Young Driver [Continued from page 236]

Johns Hopkins to study civil engineering.

Most of the top teen-age drivers practiced hard for the Road-e-o, after getting an idea from the local contest about what to expect. Desilets laid out an obstacle course in a nearby park; Vaverek, on the family farm, where he'd begun driving at 10; Betz, on a dead-end street. Mell Carey of Berkeley, Calif., a national finalist for two years straight, practiced weekends on a school playground.

Kids Want Earlier Training

After last year's finals, the entrants gottogether to discuss good driving. Carey argued that since driving is an art, it ought to be started as early as possible. He suggested that use-at-your-own-risk areas be set aside for beginners, but that licenses should be granted only after a difficult test.

Most of the others agreed that behindthe-wheel training ought to be started earlier than it often is—say at 14. Driver education is compulsory for St. Louis, Mo., high-school seniors, Jerry Kassing pointed out, but by that time "most of the kids have been driving for two years and they already have bad habits."

Several criticized school officials who balk at thoroughgoing driver-education programs because of expense. C. A. Tovey of Jacksonville, who represented Florida twice in a row, put it this way: "My instructor said it costs \$3,800 to put a youngster through high school. But what's the point if a kid gets killed in an accident on graduation day?"

It's a Long Road

An irate chief engineer was inspecting a stretch of newly built road, accompanied by the foreman in charge of the gang.

He pointed out to the bewildered foreman that the shoulder beds were off, that the curves were banked wrong, that the foundation was not right, that the leveling was far from perfect.

Finally, after the avalanche of criticism, the old foreman spat on the ground, gave his superior a bland look, and asked: "Well, how is it for length?"—Pure Oil News.

It's easy to make these

You can make loose metal, wood, or plastic parts tight; anchor bolts in concrete to stay; seal cracks in metal; tighten loose screws and fixtures in wood, metal or tile-with Smooth-On No. 1. the iron cement of many uses. Just mix, and fix. Smooth-On No. 1 hardens quickly like iron, and expands as it sets. Forced into any opening, its unique expanding action makes the repair. Keep a can on hand, it will not deteriorate. Smooth-On No. 1 is at your hardware store.



FREE Repair Handbook

48 pages, many illustrations, easy directions for ingenious time and money saving repairs you can make yourself. Write for your free copy.

SMOOTH-ON MFG. CO., Dept. 58-H 570 Communipaw Ave., Jersey City 4, N. J., U.S.A.

THE IRON CEMENT OF MANY USES



MOOTH-ON Pipe Leaks SMOOTH-ON Loose Screws



Loose Handles

RETAIL PRICE \$125.00 FACTORY TO YOU 5799

SUPERSHOP includes precisionbuilt 8" tilting table saw, vertical and horizontal drill press, 30" lathe, sander, grinder. 100% BALL BEARING. Write for FREE catalog, full details, trial plan.

POWER TOOLS, INC.

262 YATES AVE. BELOIT, WISC.



SAWS THE SUPER FILER No. 9 BEVEL GUIDE USED AS JOINTER

EASY: With this new filling lig and jointer anyone can now sharpen handsaw like new! When file hits hardened steel rollers teeth are shed and EXACTLY SAME HEIGHT. All teeth cut and saw runs true smooth. Jig and instructions \$2.95 postpoid. Free literature.



DRILL GRINDER
Sharpens round shank dritts from 3/02" to 1/2" in diameter, up 1/2" in diameter UPER DRILL GRINDER | SUPER DOWEL

A. D. McBURNEY, 5908 Hollywood Blvd., Hollywood 28, Cal., Dept. S-44

COMPLETELY AUTOMATIC

FIRST TIME AT THIS LOW PRICE OPEN CIRCUIT TYPE



Built to strict military & I.C.C. specifications

All Lungs shipped with: 2" chrome test-gauge, wrench and instructions.

shut-off valves. Water can't enter hose at mouthpiece. Ex-clusive adjustable steel cradle and harness hold tank in correct position. IMPORTANT: Double-tank design cradles securely to prevent the annoying rolling on the back experi-enced with single tank units. Single-Tank Units complete with harness, ready-to-use.....

and at exact pressure

Avoid seasonal rush! Send check or Money Order today. If C.O.D., 25% with order. 10% deposit holds purchase. Complete illustrated literature on request.

DIVE CRAFT, INC. Box 37, Wilmerding 9, Pa.

MAKES INSULATED ELECTRICAL CONNECTIONS



AMP CHAMP HAND TOOL is an electrician's tool adapted for home worshops. Makes completely insulated splices and connections in house wiring, appliances, auto, etc. It crimps solderless terminals and connectors. It splices and strips wire. No tape or solder needed. It shears bolts leaving threads undamaged. Terminals, connectors and insulators free. \$3.95 posspaid. T. W. Berger, national dealer and consumer distributor. Aircraft-Marine Products, Inc., American Bldg., Cincinnatt 2, Ohio

FREE! with Kir Terminals Connectors Insulators

City_____State__

WHAT'S NEW
ABOUT NEW

Everything! It's even more accurate, more versatile, easier to operate! See it at your dealer's now. For big, new, free booklet with 20 pages of pictures, data, drop a card to: SHOPSMITH, Dept, 286-A, 12819 Coif RA, Cleveland 8, Ohlo



FREE BOOK —"How to Do a Good Paint Job." Send card (and name of your retailer, if you wish) to Baker Brush Co., Inc., 83 Grand St., New York City 13

Brushes by Down

Finding Fortunes in Uranium [Continued from page 96]

shaft-sinking and drilling by his Utex Exploration Company shows the ore body so extensive that it may contain as much as \$100,000,000 worth of ore. Others have since struck it rich near his claims, too, and the booming new uranium region may eventually rival or surpass the Colorado Plateau's carnotite district.

Government Offers Aids

The Government doesn't mine uranium itself-it encourages private enterprise to do the job, and does all it can to help, through the AEC, the Geological Survey and the Bureau of Mines. Its experts have walked thousands of miles of canvon rims, examined more than 5,000 mines and prospecting diggings, flown airborne ore-detecting instruments more than 60,000 miles, and examined more than 40,000 samples of rock submitted by the public and their own staff. Bulletins and reports make public their findings. And prospectors may examine maps, newly posted in AEC offices on the fifteenth of each month, showing them likely places to look for uranium.

Planes carrying radioactivity-detecting instruments have flown over the mapped areas, and marks on the maps show wherever unusual radioactivity indicates possible uranium deposits. The AEC now flies six Super Cub planes equipped for this new technique of airborne prospecting, and private companies are following suit. In the new South Dakota carnotite region, three-fourths of the mines were discovered from the air.

Geological Survey parties, on their way by road to investigate reported deposits of uranium, sometimes find it nearer at hand. To miss no bets, they ride in a truck with a king-size Geiger counter on its roof. Thus uranium has been found in places where geologists would never have thought of looking for it.

How can you find uranium yourself? If you're interested seriously enough to want all the practical details, your meat is a best seller among Government publi-

[Continued on page 242]







Just dial any of 40 cuts. Parallel, clean, no sanding! Only Leave on saw for regular cuts. For 1/2, 1/8, 1/4 and \$4.95 orbors. At dealer's or order direct!

WARREN DADO WASHERS Dept. 48 P.O. Box 98, Detroit 2, Mich.

WOODCRAFTSMEN'S 144 page

ENCYCLOPEDIA Bargain book of every conceivable wood-working item and tools. Full of How-To-

Do-It information, illustrations, projects and ideas Domestic and imported woods, inlays, panels, etc. Send for your copy today. Biggest 15c worth ever offered. CRAFTSMAN WOOD SERVICE CO. Dept. 348, 2729 S. Mory Street, Chicogo 8, Illinois

LOOKING FOR THE BEST PLIER TO BUY?

CHAMPION DEARMENT TOOL CO., MEADVILLE, PA.

MAKE UP TO \$5 AN HOUR



SERR-EDGE MACHINE CO., 9733 Lorain Ave.,

THE CAHILL WONDER TO

Here is a precision instrument designed to sharpen any tool ground the house and garden.



1/3 Cash Bal, C.O.D. Ten Gross Lots \$44.00 per Gross. Send 1/2 Cash Bal. C.O.D.

one sample tool, pay postman \$1.00 plus postage. If you send \$1.00 cash pre-paid,

we will pay postage. Dozen Tools

\$5.00. Send 1/3 Cash Bal. C.O.D. Gross \$48.00. Send

Cutting bar extended for sharpening lawn mowers, sickles, scythes, garden hoes, and cleavers.

ALBERT CAHILL STEEL & IRON WORKS ADAMS AVENUE TOMS RIVER, N. J.

AUGUST 1954 741



BUILD THIS BEAUTIFUL, COST OUTDOOR FURNITURE

ATLAS Outdoor Plan Book gives you clear ONLY instructions and simple diagrams for building 18 smart, modern pieces of porch or garden furniture and equipment.

BUILD THEM BETTER WITH AMERICA'S NEWEST AND FINEST 8" TILT/ARBOR BALL BEARING CIRCULAR . . . THE GREAT NEW



ATLAS PRESS COMPANY 825 N. Pitcher St., Kalamazoo, Mich.

Send FREE LITERATURE on No. 3021 Circular Saw, and the name of my nearest franchised ATLAS dealer. ☐ Enclosed is 50c for PLAN BOOK No. 2 (65c outside U.S.)

NAME ADDRESS.

STATE CITY_

you can DO so much MORE so much BETTER with

An important addition to your home...the TOWN AND COUNTRY CARPORT -make it vourself! This basic design offers many possibilities . . . for an extra

porch, a covered terrace, framing for another poten, a covered triace, training to another room—or, as designed, a carport with tool shed, potting bench and storage compartments. The plan adapts to meet your needs, You build without blueprints! Our simplified East-Bild * Pattern #273 specifies all materials required, shows how to cut each place to size, how to finish the job professionally. You save up to two-thirds of the usual cost! The major material used is Homasote — the oldest and strongest insulating-building board on the market—distributed by building materials dealers throughout the United States and in Canada.

NEW! Three illustrated folders - suggesting 18 practical make-it-at-home projects-ranging from the attic to the cellar. Mail the coupon today for your pattern and/or folders.

"T. M. Reg. Easi-Bild Pattern Company

MAKE it at homewith HUMASU	Ŀ
HOMASOTE CO., Dept. 82, Trenton 3, N. J.	
I enclose: 10¢ for 3 folders 1 \$1.00 for Pattern #	273
NAME	

ADDRESS CITY.....STATE.....

My lumber dealer is.....

747 POPULAR SCIENCE

Finding Fortunes in Uranium [Continued from page 240]

cations, the official pocket manual entitled Prospecting for Uranium. It may be obtained for 55 cents from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., and its 123 pages of text are crammed with helpful information.

Pointers for Uranium Seekers

But here are just a few tips from experts that may help some reader to discover a new uranium deposit:

Know what uranium minerals look like. You can see them in museums, buy them from dealers in mineral specimens, or study eight color photographs of them in the Government manual.

Look in likely places. Carnotite deposits often are found along former beds of ancient streams. And they turn up in petrified logs and branches, whose carbonaceous material seems to have favored deposition of uranium.

Watch for guiding clues. Where darkpurple or black fluorite is found, the vicinity should be checked for radioactivity; sometimes dark-colored fluorite and uranium occur together, although there are many exceptions. Scattered flakes of green and yellow secondary uranium minerals, such as torbernite and autunite, may be surface signs of an underlying pitchblende vein.

Nevertheless, the most favorable site, by signs such as these, may prove utterly barren of uranium. And where there shouldn't be any uranium, by all the "rules," a bonanza may be discovered. That's the gamble and excitement of ituranium is where you find it.

What a Question

The steel worker, lunch pail in hand, was hobbling noticeably when the foreman asked the trouble.

'Got a nail in my shoe."

"Why don't you take it out?" asked the fore-

"What! . . . On my lunch hour?"-The Wyatt

Make 👺 \$10.00 an Hour, Spare Time! Assemble and Install BUCKEYE Combination Storm Windows



Your Cost Only \$6.65* You Sell For \$22.00

BUCKEYE SCREEN & WEATHERSTRIP CO. 1378 S. 22nd Street, Columbus, Ohio



NEW. IMPROVED CALCULATOR FOR WOODWORKERS only 25c

Instantly gives information on lumber, nails, concrete mixes, painting materials, etc. Convenient, simple to read. Just set dial for nail specifications, to convert linear to board feet, find bit sizes for screws, compare characteristics of woods. 6" dia-meter heavily varnished cardboard. Send 25c, no stamps, please to Greenlee Tool Co., 2128 Columbia Avenue, Rockford, Illinois.



NO. 77 VIZI-DOME WOODCARVING SET \$3.60

X-ACTO, INC. 48-41 Van Dam St. Long Island City, N. Y.

Send 20¢ for 28-page Catalog

VARIABLE SPEED HYDRAULIC POWER TRANSMISSION



tt has Infinite Speeda 0 to 550 Reverse Automatic Overload Protection: Adjustable Torque up to 180 inch pounds, 5% "Input and Output Shafts. It will handle 14 to 1½ H.P. Motor. Case measures 7½" long 7" high 61% wide. VALUE OVER \$300.

Shipping Wt. 25%. On not. \$54.50 Shipping Wt. 25#. On C.O.D. Orders we require a 10% Deposit. Shipping Co.O.D. Orders we require below the control of the contr

DIRZUIS MACHINE SHOP "Q" 1423-25 52nd Ave., Cicero 50, 111.



DRAINS cellars, cisterns, wash tubs; IRRIGATES - CIRCULATES - SPRAYS

1,001 USES-HOUSE, GARDEN, FARM Original All-Purmose Purm has 2440 GPR emocratical All-Purmose Purmose P



CUT BUILDING COSTS 3/2 Make Your Own Concrete BLOCKS and BRICKS To Use or Sell

New superior moulds make absolutely square, true, easy-to-lay blocks which will pass and building code. Production is fast ... easy. One durable \$30 machine m make our of the production is fast ... easy. One durable \$30 machine m make our of \$10 machine m make our \$10 machine m make our \$10 machine m make our \$10 machine \$10 mac

ECONOMY MFG. CO. DEPT. S STONE MOUNTAIN, GA

HOW TO STOP VALVE TROUBLES

by DUANE CARTER International Racing Champion

I race for a living . . . depend on a smoothrunning engine for my bread and butter. That's why I use Miracle Power in the gas and oil of my racers-and private car, too. You see, heat in upper cylinder areas, even in passenger cars, often reaches 1400° F .over twice the temperature at which oil burns off! So you can't count on oil to lubricate valves and lifters. But Miracle Power is not affected by extreme temperatures. It keeps valves free and lubricates when heat breaks oil down. And Miracle Power prevents Dry Starting Damage -cause of most engine wear, because oil can't reach all parts right after starting. But a light, tough film of Miracle Power is always there preventing dry metal to metal contact.

An independent laboratory reports Miracle Power means more power, longer engine life and less oil consumption - just what I've found in my experience. Get this free report from The AP Parts Corporation, Dept. 812, Toledo, Ohio. And start using Miracle Power in your gas and oil today. It will pay off for you, as for me!



Miracle Power, a blend of super lubricants, including colloidal synthetic graphite in suspension, treats the engine, not the oil. 85c size for use in gas and oil every 1000 miles and 39c size for top cylinder lubricant between treatments. (Slightly more in Canada.) Money back guarantee at car

dealers, garages, gas stations. Approved by Ford, Kaiser and Willys for sale through their dealers. C AP Parts Corp., 1954

PRECISION LEVELING INSTRUMENT for only \$1295

	With the New LEVELALL one man can do the work of two men and a transit, quickly, easily, accurately. All alone you can speedily level points for footings, forms, piping, batter boards, sills, lintels,	ì
1	floors, ceilings, roads, driveways, lawns — any type of construction work. Send for Free booklet or, better vet, order a DeLuxe Levelall today.	

Name	-
Street_	

City-State

☐ Mail 75' DeLuxe Levelall @ \$12.95 ☐ Regular 50' model @ \$9.95 ☐ Ship postpaid full price enclosed ☐ Ship C.O.D. Money-back satisfaction guaranteed. Webster Street, Rockland, Mass.



FREE! Leaflet of many uses. Write Dept. PPS 77 Box 205, New York 46 UNITED STATES PLYWOOD CORPORATION



Home "Fix-it"
Tips



Do a professional repair job with Plastic Wood. Apply it to cracks . . . handles like putty, hardens into wood . . . lasts as long as the wood it

YOU PLASTIC WOOD

Let's Put Some Science in SF [Continued from page 137]

quire refueling only a few times a year. Could not thrilling stories be told about the railroads of the future?

The sea has an endless fascination for men. Moby Dick came out of its depths. Could a new age of whaling arise from warm water set flowing by submerged islands of nuclear power?

Robot Criminals and a Robot Court?

Electronic brains can talk to each other by telephone; some of them have been put to work sifting clues to detect criminals; a few have been assigned to deal with traffic-law violators. Since automobiles that drive themselves are in experimental operation already, can we expect to have justice tempered with mercy in a robot traffic court presiding over robot drivers?

The answer to the last question is clear: no, we cannot have either justice or mercy unless science-fiction writers start now to prepare the human minds that eventually will instruct robots.

The peak of true artistry is reached when the master craftsman—sculptor, painter, musician or writer—so faithfully transmits the currents of life about him that his work reveals the future taking shape.

There can be no doubt whatever that the future of democracy depends on science. Nuclear and electronic discoveries are whirling us through space and time at ever faster speeds. Only those brains that keep pace can possibly control the good or evil that the unending spawn of machines will do. And thousands of brains are disqualifying themselves because the human spirits to which they belong have come to loathe and fear science.

Number of Science Teachers Dwindles

The crisis is not approaching. It is upon us. According to the National Manpower Council, the United States will not have enough scientists to keep up with science for at least 10 years. Fewer

[Continued on page 246]





50-Page "Tools and Rules" Book "The Tools and Rules for Precision Measuring" tells how to make ac-curacy a habit, shows the methods skilled mechanics use. 100 pictures plus reference tables. Send only one dime, Address Dept. PS.



THE L. S. STARRETT CO. . ATHOL, MASS., U. S. A.



TRANSFORMER S 19 95 FOB OUINCY Complete with everything. Ready to plug

complete with everything, Rendy to plug in, 110 voits AC. 15-30 Amps, 3 heats. Welds metal from 1/16° to ½" using 1/16° to 3/32" standard rods, Guaranteed unconditionally, 10-day trial. No C.O.D. Does everything welders costing up to \$75.00 do, Buy direct and save.

ESSAY MFG. CO., INC., Dept. 47, Quincy 69, Mass.

GIGANTIC SURPLUS

SAVE TO 70%! Paint Spray Outfits Gasoline Chain Saw

Water Pumps

- Tarpaulins
- Electronic
- Air Compressors
- Air Tanks Power Plants Olsplay Lights
 - Hydraulic Units · Surveying Inst.
- · Electric Tools Weed Spray Outfits All Freight CATALOG

URDEN SALES COMPANY

LINCOLN, NEBR.

GIGANTIC SALE

30 ea, 1/60" to 1/4" \$3.50 10 ea, 1/4" to 1/2" \$3.50 (Assorted Sizes) ORTED PRECISION SQUARES ORIED PRECISION SQUARES

Accuracy Blades — Tempered Precision Ground
2" \$1.50 6" \$2.30 Mfr.
3" 1.70 8" 2.80 Ghar,
4" 1.90 10" 3.80 Cert.
5" 2.10 12" 4.80 Incl.
Comb. Set 2" to 12" \$19.95

NEW HI-SPEED DRILLS

D. C. GENERATORS for Welding Quaranteed Perfect P.1.24V.200amp.\$12.50 R.1.30V.300amp. 21.50 Including Diagram

Sens. Perf. 0-35,000 \$9.95 (Increment 20 feet) — Brand New 0-20,000 \$4.50. Cat. 15c or Free with

Check or M.O. 25% dep. on C.O.D.-F.O.B. L.A. METRO PRECISION TOOL CO., Dept. 58 Cienega, Los Angeles 35, Cai., Phone: BRadshaw 2-2528

ALTIMETER SALE



COMPLETELY FURNISHED! for your copy

- · 60 full pages of pictures, and specifications of newest trailer models!
- Biggest free book on mobile homes ever offered! 128 pages in all!

	Manufacturers Assn. N. Wacker Drive, ois
Please send free	copy of "Mobile Life".
Name	

Wonder-Paste does the hard work in removing paint, varnish, lacquer, enamel from any surface. Softens up finish so it comes off easily—not coat by coat, but all in one scraping. Clings to upright surfaces. Remains moists oy ou can work on larger areas. At paint and hardware stores.

Harmless to wood, metal, fabric and your hands

ONDER-PASTE

Write for leaflet and advice

on your removing problem Wilson-Imperial Co., 121 Chestnut St., Newark 5, N.J.



Electric Auto-Lite, 200 Amps. 24 Voit, 2500 RPM, Dandy are welder, Wt, 53 thes. Approx. Govt, Cost \$450, NEW. \$17.50 incl. easy to follow diagram.

MAKE YOUR OWN ARC WELDER Package consists of 1 NEW Auto-Lite P1 generator, 1 giant toggle switch, glant 5.75 OHM Rheostat, 1 voltage regulator, wiring diagram chart showing conversion of Aircraft Generator to Arc Welder. SPECIA.—525.00

INTERIOR COMMUNICATION GONG



IOR COMMUNICATION GONG
BAR CHME! Single artose thime bar with sound
well that gives clear resonated Lone, ideal for use
stores, etc. as aigmal system, Mfd. by Federal and
Edwards & Co. Water Light construction, 113 Voil
Edwards & Co. Water Light construction, 113 Voil
muttiple units. Wall mounting type complete with
mounting bracket. Wt. 4 Ibs. Approx. Govt. Cost
closecot. at 36-35 ppd.

PRECISION GROUND SQUARES

PRACISION GROUND SQUARES
Production engineer's Squares, Accuracy guara
teed. Mfd. by Wright & Moore, Sheffield, Eng. Squa
blades hardened & tempered, Individually nocked in we-52.50, 4"-52.75, 5"-53, 6"-53.25, 8"-54.25, 10"

SENSITIVE ALTIMETER In 10 Ft, Increments, NEW! Famous Pioneer1 0 to 35,000 ft, (inches of Mercury). Tested and inspected in our own instrument lah, Guaranteed perfect, Approx, Govt, Cost \$150. NOW ONLY \$1.295 PREPAID!

MICROMETERS Chrome plated, precision neered, carefully tooled to give long lif-new 0-1" cap. \$2.25 ea., 1-2" cap. \$

Send 25¢ for big catalog. Bargains for everyor Check, Money Order or Cash. 25% deposit on C.O.D. order prices F.O.B. Culver City, Calif., Unless otherwise stated.

AIRBORNE SALES CO. INC. DEPT. PS854

8501 Stellar Drive, Culver City, Calif.

BRAZE Acclaimed by thousands of Homeowners, Mechanics and Hobbyists as the welder of 1001 uses, Easily operated

Hobbyists as the welder of 1001 uses. Easily operated from properly wired 110 voit. AC or DC line, The ideal gift with a life-lorg use...Order today on 10 day money back guarantee.

FOUR-WAY WELDER CO., Dept. F3-H 1810 S. Federal St. • Chicago 16, III.

NEW Aladdin ATTACHMENT FITS YOUR

1/4" POWER DRILL A wonderful time and work

SAVES TIME AND A wonderful time and work many 1085

MANY 1085

Bern and work to be the save of odoes of jobs—filting doors, screens, ing rough edges of lumber; handy included work too. Planes any EXCLISIVE ATTACHING FEATURE—Stainless steel clamp strap and four adjustable alleging screws hold planer and drill act alleging screws hold planer and drill cutting depth adjustable up to %. Strong but lightweight discast alloy frame. Long wearing gears sended in lubridge and cutter enclosed for sartery. A tool you'll appreciate.

SATISFACTION GUARANTEED OR MONEY BACK. Complete, ready to clamp to your driii......... Will ship COD plus postage fees. Literature gives complete description. \$12.95

SANDING ATTACHMENT for Planer and 2 Sanding Drums, \$1.00 extra.

DEALER INQUIRIES INVITED DEALER INQUIRIES SOLVED ALADDIN MFG. CO. KANSAS CITY, MO.

Let's Put Some Science in SF [Continued from page 244]

young people are preparing to teach science than any other subject in the publicschool curriculum. The annual crop of potential science-teaching aspirants is dwindling toward half the potential need. In the country's high schools, the significance of science has been perversely minimized by requiring one of every two science teachers to teach other subjects on the side.

What a boon it would be to these overworked professors—and to American ideals, not to mention our common safety -if the scientific background of sciencefiction were authentic enough to allow SF short stories and novels to be assigned as out-of-class reading!

Obviously, this could be a primary way to stimulate American youth to appreciate the logical spirit of scientific inquiry, to think imaginatively within a stated discipline, to carry on the warfare that science from its beginning has waged against human ignorance and miserv.

Science-fiction cannot play this vital role in our civilization as long as its writers merely label cowboy, detective and sex stories "scientific"-nor as long as their philosophy persists in dooming mankind by means of disintegrator buttons pushed by robots hot-rodding through space on comets.

I am willing to predict that the next great science-fiction classic will substitute hope for horror, faith for despair, and tell its story in the simple everyday words of the ordinary man who today fears science because he thinks "it's too far over my head."

Man Is Responsible for His Destiny

Above all, this next great SF classic will make unmistakably plain the established scientific fact that man is responsible for his acts.

The author of this future classic will not allow himself to forget that he is writing primarily about people. But neither will he accept the gibberish Wil-

[Continued on page 248]



PRECISION PLIERS

· Far occurate, exacting work use the fine, small pliers jewelers and wotchmakers use - Kraeuter's Precision Pliers. Motched in size ond handle shope, drop forged from selected tool steel, machined ond heat treated to exacting spe-cifications. For hobby crofters, model builders, TV and radio technicions.

Buy wherever fine tools ore sold in U. S. and Canada.

for next 6 issues of famous DELTAGRAM, best for next 6 issues of famous DELTAGRAM, loss thome woodworking magazine you ever saw. Packed with shop-tested ideas—12 to 15 in each issue, Send \$1 (no stamps) to: Delta Power Tool Division, Rockwell Mfg. Co, 504H N, Lexington Ave., Pittsburgh 8, Pennsylvania.

IN YOUR SPARE TIME

UP TO \$40 A DAY IN YOUR OWN BUSINESS. Easy to start repeat cash business at home with the New BELSAW...sharpening and setting circular saws, grinding planer and jointer knives. Lew Cost. only \$15 down new of the second control of the second cont

plan.



TELLS HOW



GOLD-SILVER-COINS Easily located with new Lightweight M-Scope Detector, Superior performance, lowest price, monthly payment

FREE LITERATURE FISHER RESEARCH LAB., INC.

PALO ALTO CALIF.

We will pay up to \$300,00 for information concerning new sources of scrap magnesium which we can buy on a contract basis. Any type of scrap magnesium—borings, shavings, cuttings — scrap magnesium in any form. Many plants today use magnesium and then throw the scrap away. Maybe yours does. Investigate and write today and you may qualify for a bonus of up to \$300.00.

STANDARD MAGNESIUM CORP. 8900 East 41st Street . Tulsa, Oklahoma

Extruded SAVE OVER 50% Aluminum STORM WINDOWS AND DOORS

Send for FREE "Do-It-Yourself" Book-PS854

U-FAB-IT-URSELF,

Worthington, Ohio

COMBINATION SCREEN-STORM WINDOWS & DOORS . CASEMENT PICTURE - BASEMENT WINDOWS . SCREEN DOORS & SCREENS

Exclusive GIL-BILT Build-It-Yourself Features

No machinese—summer costs with affine tone only plans, fall scale patterns, actual photographs. Sturdy wood, aluminum and steel construction scaling for \$600 and unce of commercial saws sciling for \$600 and unce of commercial saws and to \$7 years. Satisfied customarts around the same properties of the same properties of the same properties of the same properties of the same properties around the same properties of the same properties o

GIL-BILT 10-in. TILT/ARBOR SAW

• 27x28 In. table, 131/2 In. capacity in front of blade in 53/4 In. deep, tilts full 45 degrees blood model 31% high, table always sloss level

KITS

100

New Departure sall bearing arbor, 34" pre-cision shaft turned down for 58" bore blades, aium, housing, shipped ready to run, Jackserew and 4½ In. dia, handwheel lowers and raises blade Cast oluminam miter gauge and self-aligning fip fence guide.

Tip fence guide.

Gil.-Bit.T Metal Parts Kit Includes Plans, ball bearing arbor, miter gauge and bar, rip fence guide, dalo insert, lock knoles, jackeros mechanism and handwheel, and all other metal parts fees blade.

Ges blade:

See State State

GIL-BILT 12-INCH BAND SAW

Cuts to center of 24 men circle limidles stock up to 6 inches thick lax18 inch table tilts 45 degrees

I liaudies stork, in in the faches thick
Lower when and drive paticy mas on sealed New Delower when and drive paticy mas on sealed New Delower when and drive paticy mas on sealed New Delower when the sealer was a sealer of the sealer

GILLIOM POWER TOOLS P. O. Box 1-VH, Lambert Field

Made

"I did very well last year with my

IN SPARE TIME

Foleyequipment filing about 950 saws in my spare time. About \$900 for me." Leo H. Mix. New York.

E UP TO \$3 OR \$4 AN HOUR IN SPARE TIME

With a Folcy Automatic Saw Filer you can file hand, band and circular saws better than the most expert hand filer Cash business—no canvassing. No eyestrain, no experience needed.

FREE BOOK-"MONEY MAKING FACTS"

shows just how you can start at home in time. with anaro small investment, no overhead—and develop into a full-time repair shop. Send

coupon today no salesman will call.



Send Coupon for FREE BOOK

FOLEY MFG. CO 819-4 Foley Bldg., Minneapolis 18, Minnesota Send FREE BOOK-"Money Making Facts."

71018 Name

Address.



W. E. DUNN MFG. CO.

410 W. 24th St., Holland, Mich.

Let's Put Some Science in SF [Continued from page 246]

liam Tenn expounded as logic in a recent issue of Science-Fiction Adventures:

Whether the people are modern homo sapiens hammering out the first rocket, twenty-fifth century mutants hammering out the first ssl-yyrdk, robots trying to form labor unions, and roids fighting to have the manufacturer's label removed from their backsides, or monocotyledonous Arcturians pathetically attempting to smuggle themselves past Terran Immigration disguised as lima beans, it is first and foremost with their problems and view of themselves as people that the SF writer has to deal successfully.

Robots aren't and never will be human. So it's manifestly impossible for a human writer ever to think and feel like a robot. To make an issue of this distinction might be absurd at another time. But it is not absurd now. For, if any one supersition has, more than any other, caused people to reject and fear science, it is the belief that machines can be taught to think and thus to take over the management of human affairs.

Robots Can Only Follow Orders

Robots cannot think, nor will their progeny be able to think. They will be able to direct complicated tasks at high speed, and to correct mistakes they may make in the process. But their performance of the tasks will be only as efficient as human minds plan it, step by step, in advance; and the errors they correct will be only those errors that human minds foresee and calculate alternate actions for—in advance. Man's destiny will remain in man's own hands.

Science-fiction can mirror this truth of human life only by living up to its name: by applying disciplined creative imagination to the known discoveries and logical principles of science.

Dad's Contribution

The children may have their mother's eyes, intelligence and her curly hair—but they usually wind up with their father's car keys.—Wall Street Journal.

248 POPULAR SCIENCE

WELD IT YOURSELF IN A JIFFY

Weld, Cut, Braze, Solder IRON, STEEL, BRONZE, BRASS, ALUMINUM & OTHER METALS

ALUMINUM & OTHER METALS
TOOI and Equipment breakdowns are
always annoying and costly. Don't
lead to the control of the control of the control
of the control of the control of the control
on your very first job. Wedders workon your very first job. Wedders workon your very first job. Wedders workate from any properly wheel 110 v.
Ac line. Also make your own wrought
Ac first any properly wheel 10 v.
Ac line. Also make your own wrought
workshop. A Dynamic will B.
In both time and money.

DYNAMIC INDUSTRIAL YEAR

In both time and money.

DYNAMIC INDUSTRIAL type transformer Arc Welder 75 amp. output for industrial or Workshop use.

DYNAMIC WELDER CO.

Dept. D3-H, 1808 S. Federal St. Chicago 16, 111.



EASY

PAY PLAN

Low down payment. Pay as you weld. Sold on

money-back guarantee. Send for details. Complete

\$38.50

f.o.b. factory

Free Details and "How to Weld"



Catalog or 3000 Novelties 10c

sed the for maxing catalog of nevelties, live animal control of the control of th





MODERN MFG. CO. 160 N. Fair Oaks . Pasadena 1, Calif.



How Much Did You Learn?

By Stanford E. Taylor and Helen Frackenpohl

Washington Square Reading Center, New Yark

Now you can sample how much you remember of the useful and interesting information packed into this issue of POPULAR SCIENCE MONTHLY. Answers to the questions are printed just below the quiz. After each answer is a page reference to the article on which the question was based.

- 1. Taking good action pictures of boats depends in large part on
 - a. anticipating their maneuvers
 - b. correct shutter speed c. keeping the wind to your back
- 2. This is a good way to



- a. unsnarl fishing line b. wind a Tesla coil
- c. repair a telescope
- 3. West Virginia's 87 miles of new hillhopping superhighway have
 - a. 76 bridges
 - b. 14 tunnels
- c. no toll gates
- 4. Hydrojet is a form of propulsion used in
 - a. seaplanes
 - b. model boats

c. amphibious troop carriers

- 5. This year's Teen-Age Road-e-o to pick a national champion driver has attracted
 - a. 30,000 entrants b. 140,000 entrants
 - c. 250,000 entrants
- 6. The fabulous new aircraft carrier Forrestal, to be launched this fall, has a length of
 - a. 893 feet
 - b. 1,039 feet
 - c. 1.203 feet
- 7. The hopper 'dozer was used to
 - a. move grain b. collect grasshoppers
 - c. level jungle airstrips
- 8. MOUSE, an artificial satellite, is designed to be fired into the upper atmosphere to
 - a. serve as an interplanetary observatory b. direct guided missiles
 - c. study solar and cosmic radiation
- If traveling down a long mountain grade causes your brakes to fade, you know that
 - a. temperature is to blame
 - b. your brake fluid is low
 - c. the linings are worn
- The Atomic Energy Commission's part in the national hunt for uranium is to
 - a. take over the mining operation
 - b. buy up all the ore mined
 - c. arrange for loans on mining equipment

Answers: 1. a-p. 166; 2. b-p. 190; 3. a-p. 65; 4. b-p. 170; 5. c-p. 80; 6. b-p. 128; 7. b-p. 116; 8. c-p. 72; 9. a-p. 100; 10. b-p. 92.

NEXT MONTH ...

The New Boom in Table-Top Trains

Lack of space need no longer keep you from the fun of scale-model railroading. With tiny TT gauge, an elaborate layout the son a table top—or into a suitcase. The September issue of PSM will tell how to get started and show interesting setups built by experts in this booming hobby.



This One

TERRIFIC VALUES GIANT 2000-2500

OATT FACTOR OF CALLEY OF CALLEY BY A STATE OF CALLE

JET STEAM MASTER

FIT STEAM MASTER

AND THE CONTROL OF THE CONTROL OF

EXTENSION CORD

EXTENSION CORD

Very flexible and tought;
Neugering = 10.2; conductor

Neugering = 10.2; conductor

Neugering = 10.2; conductor

place = 10.2; con

HEAVY DUTY D-C ARC WELDER Eige as portable or shop welder. Up to 300 amos, Senior model, Made for trouble-free, continuous service, Will bandlings and service will

with the control price. Sept. 10 control price. Sept.

IT'S - NEW

NOW - IT'S EASY!

Solder like an Expert! "MIRACLE SOLDER PAINT

Solder All Common Melols FASTER . STRONGER . MORE ECONOMICAL ONE LB. = 4 LBS. ORDINARY WIRE" SOLDER FREE "Soldering Technique Guide". Agents Wanted

BOW SOLDER PRODUCTS 251-P FREEMAN ST. . BROOKLYN 22, N.Y.

JUST PAINT ON AND HEAT ONE LB. \$295 POSTPAID GUARANTEED

at MASTER MECHANIC'S Factory Prices

PORTABLE LIGHT PLANTS

Direct from

600-700 WATIS
905-8 BUTTON START
15 v. 96 cyc. AC
2 HP casy starting
Briggs engine. No
wiring necessary;
erate, Plenty of current for any oil hurnor, freezer, brooder,
conerg-ways.

yp to 700 wats, Ideal for Crew of the Part of the Part

9 TON HYDRAULIC PRESS

A CON HYDRAULI PRES.

A tenuendustic powerium indiramine in the present post of the control in the present pre

Variable Speed Selector

Hariable Speed Selection

Berry Bully, made to B. F.
Berry Bully, made to B. Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully, made to B.
Berry Bully,

SAVE UP TO 85%

DIESEL LIGHT PLANT DIESEL LIGHT PLA

Illem 1 days 1 Mass

Illem 1 days 1 Mass

Illem 2 days 1 Mass

Illem 1 days

\$1895.00

CONDITIONAIRE ATTIC FANS

Now, at new low cost, you can relax . . . live and sleep contour hande deaths and large volume or all-recoil the large volume of all large volume of a

VENTILATING FAN

Heart 100 acres to make a construction of the construction of the

CONDITIONAIRE VENTILATING FANS

Salve togic money justanting your own exhaust fan. Effectent propelled by the land of the



anarantee. SEND 10c for --- 8

BUILD HELICOPTER GLIDER



The famous new GYRO-GLIDER, world's smallest and safest alreraft, is now available to the same state of the same state o

tions, BENSEN AIRCRAFT CORP., Dept. PS-7 P. O. Box 2621, Raieigh, N. C. Name.......Address..... Clty......State.....

AUGUST 1954 251

How I foxed the Navy

by Arthur Godfreu

The Navy almost scuttled me. I shudder to think of it. My crazy career could have ended right there.

To be scuttled by the Navy you've either got to do something wrong or neglect to do something right. They've got you both ways. For my part, I neglected to finish high school.

Ordinarily, a man can get along without a high school diploma. Plenty of men have. But not in the Navy. At least not in the U. S. Navy Materiel School at Bellevue, D. C., back in 1929. In those days a bluejacket had to have a mind like Einstein's, And I didn't.

"Godfrey," said the lieutenant a few days after I'd checked in, "either you learn mathematics and learn it fast or out you go. I'll give you six weeks." This, I figured, was it. For a guy who had to take off his shoes to count



above ten, it was an impossible assignment.

I was ready to turn in my bell-bottoms. But an ad in a magazine stopped me. Here, it said, is your chance to get special training in almost any subject-mathematics included. I hopped on it. Within a week I was enrolled with the International Correspondence Schools studying algebra, geometry and trig for all I was worth.

Came week-end liberty, I studied. Came a holiday, I studied. Came the end of the six weeks, I was top man in the class. Within six weeks I had mastered two years of high school math, thanks to the training I'd gotten.

I.C.S. made the impossible—easy!

GET EXPERT 3 FREE BOOKS 1. 36-page, pocket size career guide "How to Succeed." 2. Illustrated catalog GUIDANCE 3. Free sample lesson text to demostrate I.C.S. method-

For Real Job Security-Get an I. C. S. Diploma!

I. C. S., Scranton 9, Penna.

INTERNATIONAL CORRESPONDENCE SCHOOLS BOX 7688-N, SCRANTON 9, PENNA. (Partial list of 277 courses) BEFORE which have marked X (plus sample lesson): Refore which have marked X (plus sample lesson): Refore which have marked X (plus sample lesson): Refore which have been a series of the series of booklet about the field BEFORE which I have marked X (plus sample lesson): at cost or obligation, send me "HOW to SUCCEED" and the opp pportunity soosue about the need CIVIL, ST RUCTURAL ENGINEERING Civit Engineering Construction Engineering Highway Engineering Reading Struct. Blueprints Sanitary Engineering Structural Engineering Structural Engineering Surveying and Mapping DRAFTING AVIATION Aeronautical Engineering Jr. Aircraft & Engine Mechanic BUSINESS ARCHITECTURE and BUILDING CONSTRUCTION CONSTRUCTION Air Conditioning-Refrig. Architecture Building Contractor Building Maintenance Carpenter end Mill Work Estimating Heating Painting Contractor Plumbing Reading Arch. Blueprints Steenmitting Arcraft & Engine Mechanic USSINIAS Boxkeeping and Accounting Beniness Administration Boxkeeping and Accounting Beniness Administration Certiful Beniness Administration Certiful Beniness Accounting Creater Salemannia) Letter writing temporement Measuring Salemannia Salemannia Beniness Measuring Salemannia Salemannia Certiful Salemannia Cert DAFFTING Aircraft Drafting Electrical Drafting Mechanical Drafting Mine Surveying and Mapping Ship Drafting Ship Drafting Cartoning Commerciet Art Fashion Illustrating Magazine Illustrating Show Card end Sign Lett Sketching end Painting AUTOMOTIVE Structurel Drefting ELECT RICAL Electrical Engineering Electrical Maintenance Electrician Contracting Lineman HIGH SCHOOL Commercial _Working Hours_ A.M. to P.M. Canadian residents send coupon to International Correspondence Schools, Canadian, Ltd., Montreal, Caneda. . . . Special tuition rates to members of the U. S. Armed Forces.

HOWTOHX

Engines, Brakes, Transmissions, Rear Ends, Carburetor

7 2:1:31 03



(g) 1 3 T

COVERS 685 MODELS - ALL THESE MAKES

Buick Cadillac Chevrolet Chrysler Crosley DeSoto Dodge Ford Frazer Henry J Hudson Kaiser Lincoln Mercury Nash Oldsmobile Packard Plymouth Pontiac Studebaker Willys

Includes ALL 1954 cars

New Engines Power Steering

ALL Auto-matic Transmissions

Much, Much. Maret

You Can "Breeze Through" ANY AUTO REPAIR JOB! MOTOR'S BIG BRAND-NEW AUTO REPAIR MANUAL Shows You H With 2,950 PICTURES AND SIMPLE STEP-BY-STEP INSTRUCTIONS

COVERS EVERY JOB ON EVERY CAR BUILT FROM 1940 THRU

Same FREE Offer On

MOTOR'S Truck and Tractor Manual

BRAND NEW! Covers EV-BY Job on EVERY popular make and model gasoline-sowered truck, tractor nade from 1946 thru 1954,

Over 2,200 Illustrations: 200 quick-reference chart-includes service and repair procedures, essential spec-fications and trouble shoot-ing on Cummins Diesels and GM Diesels. Also cov-ers buses and industrial units. 850 pages.

YES, it's easy as A-B-C to do any "flx-it" job on any car whether it's a simple carburetor adjustment or a complete overhaul. Just look up the job in the index of MOTOR'S New 1,000page AUTO REPAIR MANUAL, Turn to pages and pictures covering job, Follow the clear, illustrated step-by-step instructions. Prestothe job is done

No guesswork! MOTOR'S Manual takes nothing for granted. Tells you where to start, What tools to use. Then it leads you easily and quickly through the entire operation!

2,950 Pictures! So Complete, So Simple, You CAN'T Go Wrong!

BRAND-NEW, REVISED edition! ONE THOUSAND giant pages cover everything you need to know to repair any car. 2950 "This-Is-How" pictures lead you every step of the way, 292 "Quick-

Check" charts-22.598 essential repair specifications. Over 225,000 service and repair facts on ALL 685 chassis models from 1940 thru 1954. Instructions and pictures so clear you can't go wrong!

Even a green beginner mechanic can do a good job with this giant guide before him. You'll find yourself tackling jobs now that you wouldn't even touch before! And if you're a top mechanic, you'll value the time and laborsaving factory methods! No wonder of thousands of men call it the "A

The "Meat" of Over 140 Official Sho

The editors have put together the from over 140 Official Shop Manual

dreds of service bul "boiled it down" into illustrated easy-to-u guide.

Here's ILLUSTRA by-step guidance you n ice and repair all types (including new Buick Mercury overhead valv New Torque Converte Automatic Transmiss Chokes . . . Fuel Pump tion Systems . . . Gen Carburetors . Univ

Axles . . . Brakes Steering . . . Shock Ab Air Conditioning, AND MUCH MC

SEND NO MONEY Mail FREE-TRIAL Postcard NO

Send no money. Try this book at ou whole week absolutely FREE: Test it garage or shop. Make it show you what doesn't pay for itself in 7 days, just real not be showned by the showned free NOW to MOTOR Book Dept., Desk 21 \$\$\frac{2}{2}\$\$\frac{1}{2}\$\$\fr

John Wayne...a Camel fan goin' on 24 years!



For MILDNESS ... for FLAVOR

Camels agree with more people than any other cigarette!